

**FINAL**

**TECHNICAL MEMORANDUM  
IN-WATER REMOVAL WORK**

**Bradford Island Landfill  
Cascade Locks, Oregon**

**October 2002**

*Prepared for:*



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## 1.0 INTRODUCTION

The Bradford Island Landfill is a former waste disposal site located at the Bonneville Lock and Dam Project near Cascade Locks, Oregon. U.S. Army Corps of Engineers (USACE) is the owner of the Bradford Island Landfill, and is in the process of investigating the landfill. USACE is conducting the landfill investigation under the oversight of the Oregon Department of Environmental Quality (DEQ), through the Voluntary Cleanup Program.

During hydrographic and underwater dive surveys conducted in October and November 2000, the USACE identified the presence of waste-related items, including electrical items that contain polychlorinated biphenyls (PCBs) submerged in the Columbia River adjacent to the Bradford Island Landfill. Some of the waste-related items were removed in December 2000. Analytical chemistry results from the sediment sampling conducted during the December 2000 recovery operations indicated the presence of PCBs. At the request of DEQ and United States Fish and Wildlife (USFW) (the “agencies”), USACE conducted an investigation of the river to help assess the extent and impacts of site-related contaminants. The scope of the investigation was based on the agencies’ input and included sampling and analysis of water, sediment, and benthic aquatic specimens. The investigation also included simulation of impacts resulting from removal of wastes from the river. The findings of this investigation were presented in URS’ *In-Water Investigation Report, Bradford Island Landfill*, dated March 2002.

Based on the *In-Water Investigation Report*, the experience gained during the partial removal of debris in December 2000, and the available work window to meet fish protection goals, USACE determined that the PCB-containing electrical equipment should be removed during the current in-water work period (November 15 to March 15) to protect human and ecological receptors. USACE contracted URS Corporation (URS) to observe, document, and monitor the removal under Contract DACW57-99-D-0005 Delivery Order No. 0008. This report summarizes the results of the removal activities completed between February 14 and March 4, 2002.

## **2.0 SITE LOCATION AND DESCRIPTION**

Bradford Island is part of the Bonneville Lock and Dam Project. At this location, the Columbia River forms the border between the states of Oregon and Washington (Figure 2-1). The landfill site is in the State of Oregon. The site is within the southwest quadrant of Section 22, Township 2 North, Range 7 East, Willamette Meridian.

Figure 2-2 shows the location of the landfill, the portion of the river investigated in 2001, and the locations of the work described in this report. The depth of the river in the area where the electrical equipment removal occurred ranges from about 30 to 40 feet.

## **2.1 PROJECT TEAM**

The companies that USACE assembled for this project are summarized below along with their responsibilities.

### **USACE**

USACE coordinated field logistics with the dam operators, contracted with the team members (URS, Foss Environmental [Foss], and Advanced American Diving [Advanced American]), and directed the work performed by the team members

### **URS**

URS observed, and documented the work performed by the team, and coordinated with Advanced American divers to collect water column samples for analysis.

### **Advanced American Diving**

Advanced American Diving (Advanced) provided a team of divers, two work barges, and a tugboat for recovery operations, and assisted URS with the collection of water column samples.

### **Foss Environmental**

Foss managed the recovered waste items after they were brought to the surface by the divers, provided spill contingency planning and response, and assisted USACE with waste characterization and waste management.

### **3.0 PROJECT OBJECTIVES AND REMOVAL ACTIVITIES**

#### **3.1 PROJECT OBJECTIVES AND APPROACH**

The purpose of the work was to remove the underwater debris from the Columbia River adjacent to Bradford Island, and to collect water quality samples during the removal action. The water quality samples were collected to identify the impact of the debris removal on river water quality and provide data which may be used as part of future site evaluations.

The primary objectives of the equipment removal were:

- Remove the electrical items present in the Columbia River located proximate to the landfill.
- Collect and analyze water column samples from the area surrounding the underwater debris and an background location.
- Conduct turbidity monitoring during the removal action from the area surrounding the underwater debris and from one upgradient location.

#### **3.2 VARIANCES FROM ORIGINAL SCOPE**

Following an unsuccessful attempt to install the turbidity screen in accordance with the Work Plan, an alternate turbidity method was proposed and accepted by the Agencies. Appendix A contains the proposal from the USACE to the Agencies. In general, the variance consisted of continuous down current monitoring for turbidity. Additionally, the identified upgradient location for water column and turbidity monitoring (Picture Rock) was insufficient since the river flow direction changes in the vicinity of the island due to operation of the dam. The river flows east in the vicinity of the work area; therefore the upcurrent turbidity measurement was collected on the most upcurrent location on the barges.

#### **3.3 DEBRIS REMOVAL ACTIVITIY**

The proposed plan was to remove all electrical equipment (debris) and transport these wastes to an appropriate disposal facility. Additionally, if non-electrical debris was observed that may contain hazardous materials, such as a grease bucket, these items will be removed. The other non-electrical debris, (i.e. wire and concrete), was not planned to be removed to minimize disturbance to potentially impacted sediments. However, it was evident that in order to evaluate if additional debris was located beneath the large coils of wire rope discovered in Piles #1 and #2, they would need to be removed. Therefore all wire rope observed in the river as well as along the shoreline was removed. The removal was staged from barges and work boats mobilized to the work areas. The higher than expected water velocity prevented the deployment of the engineering controls. Turbidity monitoring was conducted during all removal activities.

### 3.3.1 Removal Activities

A spud barge mounted with a crane and a flat deck material barge was positioned outside the work areas at each of the three specified piles to serve as working and debris recovery platforms. A tug and one or two work boats also assisted with the removal operations, monitoring and sampling. Upon starting at a pile, the divers first set an underwater line that established the edge of the pile. This line was based on the planned locations of the turbidity screens, therefore it was larger than the previously delineated limits of the piles. The divers then searched for and recovered debris starting from one end of the debris pile using a line search method. The line search method consisted of searching along a 50 to 75 foot long line anchored to the edges of the underwater line. If the area to be searched was larger than could be covered in one pass along the search line, the area was divided into manageable sections. For instance, Pile #1 was divided into a north and south half and Pile #2 was divided into west, middle and east thirds (see Figure 3-1). The divers swam the length a line and searched for electrical equipment, stopping to recover debris when it was found. Once all electrical equipment was recovered along the search transect, the line was advanced in 5-foot increments along the debris field until the area was completely searched. A video camera mounted on the diver's helmet recorded underwater activities.

When a piece of debris was encountered, the diver assessed whether the piece could be manually placed into a metal box by hand or whether it would need to be directly removed using the crane.

Before hoisting items or placing them in the metal work box, the type of item was identified and assessed whether the item could contain liquids (e.g., inerteen capacitor), or contained solid PCBs (e.g. lighting ballasts) and was damaged. When this occurred, the sediments adjacent to and beneath the item was removed using a small hydraulic pump fitted with a hose directed by the diver. The following procedure was used at these locations:

- One diver removed the sediments adjacent to the item and the effluent was placed into a 55-gallon drum.
- The second diver began lifting and placing the item into a reinforced 8-mil plastic bag, at which time the first diver was attempting to capture the suspended sediment with the pump.
- Once the item was removed and placed into the metal box, the first diver removed the sediment that was immediately beneath the item.

Once at the surface, each item was placed into plastic-lined storage bins in a containment area on the materials barge, or PCB containing equipment was placed into 55-gallon drums. The containment area was lined with oil absorbent mats and socks to minimize the potential for leakage into the river.

### **3.3.2 Monitoring and Sampling Activities**

The monitoring and sampling and analysis program during the removal action included the water-column sampling and turbidity monitoring.

#### **3.3.2.1 Water-Column Sampling**

Sampling was conducted during removal actions in all three pile locations to measure the concentration of PCBs and suspended sediment in the water column during debris removal. At Pile #1 one water column sample was collected before removal activities were initiated to measure the steady state concentration of PCBs in the water column in this location (sample number 04WC). The timing for the other samples collected coincided with elevated turbidity measurements in each work area. The sample of the water and associated suspended sediment was collected using a peristaltic pump. The pump was stationed on the work barge and operated by URS. A ½ inch diameter PVC tubing, which was connected to the pump, was given to the diver to take to the sampling area. One diver held the intake end of the tubing and the turbidity probe, while a second diver conducted the search and recovery efforts. The sample intake hose was between 10-30 feet from the removal effort at all times during the sampling.

#### **3.3.2.2 Turbidity Monitoring**

To ensure compliance with the prescribed standard of 5 NTU above background, and the revised monitoring schedule, continuous monitoring (10 – 15 minute intervals) was conducted down current of the divers during all removal activities. Up current measurements were obtained on a hourly basis. A turbidity profile was measured at approximately 20%, 60%, and 80% of river depth at both monitoring stations.

## 4.0 REMOVAL RESULTS

### 4.1 WASTES RECOVERED

The wastes recovered and approximate volume or number of items are summarized in Table 4-1. Photographs of the items are provided in Appendix B. The majority of the PCB-containing items were recovered from one general area in Pile # 1 and one general area in Pile # 2. The portion of the island immediately upland from Pile #3 contained a large number of broken glass and electrical light bulb sockets. These items were noted but not removed during this effort.

### 4.2 SEDIMENT REMOVAL ACTIVITIES

Sediment removal activities were initiated beneath and around electrical items that contained liquid PCBs or contained solid PCBs and that were not intact. When such an item was located, care was taken not to disturb the sediments surrounding the item, by not resuming removal activities around the item until it and the sediments were removed. Sediment removal activities were conducted beneath two light ballasts in Pile #2 (the “Jefferson Mercury” ballast, and the “grey-dome top” ballast). The other ballasts and the oil filled switches were intact upon discovery. Therefore, no sediment removal was conducted beneath these items. Sediments were removed beneath five inerteen capacitors and the “silver finned” ballast in Pile #1. The remaining inerteen capacitor was located on a large boulder and therefore no sediments were available for recovery. All the inerteen capacitors appeared intact. One of the inerteen capacitors had a loose ceramic top that broke during handling at the surface (see Photo #9). No oil was released. The other ballasts located in Pile #1 were intact. The coupling capacitors (all from Pile #1) appeared intact, however, upon recovery and ambient heating, grease from one of the capacitors flowed into the container in which it was stored. PCB containing items were not recovered from Pile #3.

A total of seven 55-gallon drums of sediment and water were generated during the sediment removal activities. The locations of the sediment removal activities are depicted on Figure 4-1.

## **5.0 SAMPLING ACTIVITIES AND RESULTS**

### **5.1 WATER COLUMN SAMPLING RESULTS**

The water column samples were shipped to the analytical laboratory the day following collection. Prior to the laboratory filtering each water column sample, an aliquot was separated from the sample and analyzed for organic carbon. The sample was then filtered by the laboratory using a 0.7-micron glass fiber filter and was separated into dissolved and particulate phases. The dissolved phase was analyzed for PCBs and organic carbon, and the particulate phase was analyzed for PCBs only, due to the lack of solids in the sample. The concentration of organic carbon in the particulate phase was estimated by subtracting the concentration of organic carbon measured in the total sample from the concentration in the dissolved phase.

#### **5.1.1 PCBs**

The PCB Aroclor concentrations at all of the sample locations from Pile #3 and Pile #2 were below the maximum laboratory practical quantitative limit (PQL) of 0.01 µg/L for Aroclor 1221 or 0.005 µg/L for the remaining Aroclors. The results of the steady state sample collected at Pile #1 indicated that PCBs as Aroclors were not reported above the PQL. Table 5-1 summarizes the analytical chemistry results for detectable Aroclors.

The sampling at Pile #1 indicated that PCBs as Aroclor 1254 were detected at 0.0186 µg/L (Sample number 05WC) and 0.0218 µg/L (Sample number 07WC) in the particulate phase and at 0.0308 µg/L (Sample number 07WC) in the dissolved phase. The field duplicate sample for sample number 05WC reported 0.0347 µg/L of Aroclor 1260.

All data was reviewed in accordance with USACE protocol. Appendix C contains the data review report for the samples. Appendix D contains the analytical chemistry laboratory reports.

#### **5.1.2 Total Organic Carbon**

Analytical results for dissolved organic carbon ranged from 1.83 mg/L in sample 06WC (Pile #1) to 8.19 mg/L (Pile #3). This agrees with the general observation that the sediments within the vicinity of Pile #3 were generally more fine grained than the other two piles. The total organic carbon (as measured by the combination of the dissolved and the particulate phases) ranged from 1.7 mg/L in sample 05WC (Pile #1) to 2.44 mg/L in sample 04WC (Pile #1).

### **5.2 TURBIDITY MONITORING RESULTS**

The turbidity monitoring results are summarized on the Field Turbidity Data Sheets provided in Appendix E. Turbidity during recovery efforts did not exceed the limit set by DEQ of 5 NTU above the previous upcurrent reading. Approximately 580 turbidity measurements were collected during the sampling and recovery efforts. The average for all three locations was

approximately 5-6 NTU. The turbidity measurements ranged from 0.86 NTU to 10.86 NTU at Pile #1; from 1.86 NTU to 10.46 NTU at Pile #2; and, from 2.42 NTU to 9.39 NTU at Pile #3.

### **5.3 SEDIMENT AND WATER WASTE MANAGEMENT**

Following generation of the sediment and river water during the sediment removal activities, each media was sampled by the USACE to characterize the waste and evaluate disposal options. Table 5-2 summarizes the PCB analytical results for each drum of waste generated. Detectable concentrations of Aroclors 1242 and 1248 were reported in the sediment ranging from 0.149 mg/kg to 6,470 mg/kg. Detectable concentrations of Aroclor 1242 were reported in the water ranging from 3.66 µg/L to 42.7 µg/L. The accuracy of these data has not been evaluated. The PCB concentrations are inconsistent with existing site characterization data.

The waste was shipped offsite by USACE for disposal based on the waste characterization results.

### **5.4 ELECTRICAL EQUIPMENT SAMPLING RESULTS**

In order to determine the disposal options for the PCB-containing waste recovered, the equipment was opened and a sample was collected by the USACE from the solid or liquid material in the equipment and analyzed for PCBs. Table 5-3 summarizes the analytical results of the current and previous (December 2000 removal effort) testing of the equipment for PCBs. The results for the coupling capacitor was significantly different than what was reported previously (980 mg/kg vs. 1.99 mg/kg).



## 6.0 SUMMARY

Electrical items and other solid waste were removed from the three identified areas and associated upland portions from February 14 and March 4, 2002.

The primary objectives of this project included the following:

- Remove the electrical items present in the Columbia River located proximate to the landfill.
- Collect and analyze water column samples from the area surrounding the underwater debris.
- Conduct turbidity monitoring during the removal action from the area surrounding the underwater debris.

The divers located the electrical items and any other solid waste located within the three identified areas. The divers removed all items from these areas assisted by a barge-mounted crane. All waste removed was placed on a materials barge and sorted for disposal purposes. Additionally, solid waste items located upland from Pile # 2 and Pile #1 (primarily wire rope) were removed and placed in the bins on the materials barge. A total of 32 tons of solid waste was removed from the in-water and upland areas. Four 55-gallon drums of PCB containing electrical debris was recovered and seven 55-gallon drums of sediment and water were generated. PCBs as Aroclor 1242 and 1248 were detected in the sediment up to 6,470 mg/kg. The debris and sediment and water were transported off-site by USACE for disposal.

PCBs, as Aroclor 1254, were detected in the water column during the recovery activities up to 0.0218 µg/L (Sample number 07WC) in the particulate phase and 0.0308 µg/L (Sample number 07WC) in the dissolved phase. Additionally, PCBs as Aroclor 1260 were detected at 0.0347 µg/L in the particulate phase.

Approximately 580 turbidity measurements were collected during the sampling and recovery efforts, with the average turbidity of approximately between 5 and 6 NTU. Turbidity during recovery did not exceed the limit set by DEQ of 5 NTU above the previous upcurrent reading.

# TABLES

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**TABLE 4-1**  
**Log Of Recovered Items**

Item	Approx. Volume/Number Removed During 02/02- 03/02	Approx. Volume/Number Removed During 03/00, 12/00 & 02/01
<b>PILE NUMBER 1</b>	--	--
<b>Non-PCB containing</b>	--	--
Control Panels	9	30 + broken parts
Ceramic Fuse Holder	1	--
Black Plastic Fuse Breaker	1	--
Light Bulb ends/centers	10	--
Post Insulators	25 partials	10 + broken parts
Electric Motor	1	--
Wire Rope	10-20 cubic yards	--
Miscellaneous Scrap Metal	10-20 cubic yards	--
Communication Boxes	2	--
Ceramic Pieces	10 gallons	--
Transite Pipe 2 inches in diameter	2 pieces	--
Fuse Box	1	--
Electric Motor Windings	1	--
Solenoid	1	--
Concrete Disk (3 feet in diameter)	1	--
<b>PCB Containing</b>	--	--
Lightening Arresters	7	16 + broken parts
Coupling Capacitors	5	--
Inerteen Capacitors-(2) 2 gallon & (4) 3 gallon	6	1
"Black Box" Lighting Ballast	1	--
"Silver Finned" Lighting Ballast	1	--
<b>PILE NUMBER 2</b>	--	--
<b>Non-PCB containing</b>	--	--
Communication Boxes	28	--
Motor Windings (2 feet in diameter)	2	--
Wire Rope	10-20 cubic yards	--
Metal Rods (1/2 inch in diameter-3 to 4 feet long)	14	--
Control Panels	4	--
Fuse Box	1	--
Ceramic Insulators/pieces	10 gallons	--
Miscellaneous Scrap Metal	10-20 cubic yards	--
Transite Pipe 2 inches in diameter	2 pieces	--
Black Plastic Fuse Breaker	2	--
Wood Stove	1	--
<b>PCB Containing</b>	--	--
Oil-Filled Switches	5	--
Lightening Arresters	7	--
"Black Box" Lighting Ballast	2	--
"Jefferson Mercury" Lighting Ballast	1	--
"Grey-Dome Top" Lighting Ballast	2	4
"Long Black Rectangle" Lighting Ballast	1	--
<b>PILE NUMBER 3</b>	--	--
<b>Non-PCB containing</b>	--	--
Post Insulators	4 whole and 12 partials	--
Light fixture bottoms (4 main types)	3-4 gallons	--
Miscellaneous ceramic piece (black center that could be PCB containing)	1 broken piece	--

# TABLES

**TABLE 5-1**  
**Analytical Data Summary**  
**In-Water Removal Work**

Sample ID	01WC	02WC	03WC	04WC	05WC	06WC	07WC
Location	Pile #3	Pile #2	Pile #2	Background	Pile #1	Field Duplicate of 05WC	Pile #1
Date Collected	02/20/02	02/22/02	02/26/02	02/27/02	02/28/02	02/28/02	3/4/2002
PCB Aroclors							
Particulate (mg/L)							
1254	0.005 U	0.005 U	0.005 U	0.005 U	<b>0.0186 J</b>	0.005 U	<b>0.0218</b>
1260	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	<b>0.0347 J</b>	0.005 U
Dissolved (mg/L)							
1254	0.005 UJ	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	<b>0.0308</b>
1260	0.005 UJ	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Organic Carbon							
Dissolved - mg/L	<b>8.19 J</b>	<b>2.48 J</b>	<b>3.52 J</b>	<b>4.2 J</b>	<b>1.89 J</b>	<b>1.83 J</b>	<b>2.84 J</b>
Dissolved and Particulate - mg/L	NA	<b>2.05 J</b>	<b>1.91 J</b>	<b>2.44 J</b>	<b>1.7 J</b>	<b>2.4 J</b>	<b>1.9 J</b>

**NOTES:**

Detected analytes are bold.

NA - Not analyzed due to insufficient sample volume.

J - The associated numerical value is an estimate.

U - The analyte was not detected above the reported sample quantitation limit.

UJ - The analyte was not detected above the reported, estimated sample quantitation limit.

# TABLES

**TABLE 5-2**  
**Analytical Data Summary**  
**Sediment and Water Generated from the Sediment Removal Activities**  
**Sediment**

Sample ID		99-0-11 Sediment	99-0-16 Sediment	99-0-17 Sediment	99-0-18 Sediment	99-0-19 Sediment	99-0-14 Sediment	99-0-15 Sediment
Location		Pile 1 Drum 1	Pile 1 Drum 2	Pile 1 Drum 3	Pile 1 Drum 4	Pile 1	Pile 2 Drum 1	Pile 2 Drum 2
Sample Date	Units	6/28/2002	6/28/2002	6/28/2002	6/28/2002	6/28/2002	6/28/2002	6/28/2002
PCBs								
Aroclor 1016	ug/kg	33,500 U	26,800 U	6,700 U	268,000 U	1,340,000 U	67.0 U	67.0 U
Aroclor 1221	ug/kg	67,000 U	53,600 U	13,400 U	536,000 U	2,680,000 U	134 U	134 U
Aroclor 1232	ug/kg	33,500 U	26,800 U	6,700 U	268,000 U	1,340,000 U	67.0 U	67.0 U
Aroclor 1242	ug/kg	33,500 U	<b>45,600</b>	<b>76,300</b>	268,000 U	1,340,000 U	67.0 U	<b>276</b>
Aroclor 1248	ug/kg	33,500 U	26,800 U	6,700 U	268,000 U	1,340,000 U	67.0 U	67.0 U
Aroclor 1254	ug/kg	<b>116,000</b>	<b>66,800</b>	<b>37,300</b>	<b>1,440,000</b>	<b>6,370,000</b>	<b>286</b>	<b>149</b>
Aroclor 1260	ug/kg	33,500 U	26,800 U	6,700 U	268,000 U	1,340,000 U	67.0 U	67.0 U

## Water

Sample ID		99-0-11 Water	99-0-16 Water	99-0-17 Water	99-0-18 Water	99-0-19 Water	99-0-14 Water	99-0-15 Water
Location		Pile 1 Drum 1	Pile 1 Drum 2	Pile 1 Drum 3	Pile 1 Drum 4	Pile 1	Pile 2 Drum 1	Pile 2 Drum 2
Sample Date	Units	6/28/2002	6/28/2002	6/28/2002	6/28/2002	6/28/2002	6/28/2002	6/28/2002
PCBs								
Aroclor 1016	ug/L	1.43 U	1.43 U	7.14 U	1.43 U	1.43 U	1.43 U	1.43 U
Aroclor 1221	ug/L	2.86 U	2.86 U	14.3 U	2.86 U	2.86 U	2.86 U	2.86 U
Aroclor 1232	ug/L	1.43 U	1.43 U	7.14 U	1.43 U	1.43 U	1.43 U	1.43 U
Aroclor 1242	ug/L	<b>3.56</b>	<b>2.41</b>	<b>42.7</b>	<b>3.66</b>	<b>11.4</b>	1.43 U	1.43 U
Aroclor 1248	ug/L	1.43 U	1.43 U	7.14 U	1.43 U	1.43 U	1.43 U	1.43 U
Aroclor 1254	ug/L	1.43 U	1.43 U	7.14 U	1.43 U	1.43 U	1.43 U	1.43 U
Aroclor 1260	ug/L	1.43 U	1.43 U	7.14 U	1.43 U	1.43 U	1.43 U	1.43 U
Metals-TCLP								
Arsenic	mg/L	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U
Barium	mg/L	<b>1.50</b>	<b>1.49</b>	<b>1.43</b>	<b>1.70</b>	<b>2.02</b>	<b>1.46</b>	<b>1.33</b>
Cadmium	mg/L	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U
Chromium	mg/L	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U
Lead	mg/L	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U
Mercury	mg/L	0.000267 U	0.000200 U	0.000267 U	0.000200 U	0.000267 U	0.000267 U	0.000200 U
Selenium	mg/L	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U
Silver	mg/L	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U

### NOTES:

Detections are in bold.

U - The analyte was not detected above the reported sample quantitation limit.

NA - Not analyzed

# TABLES

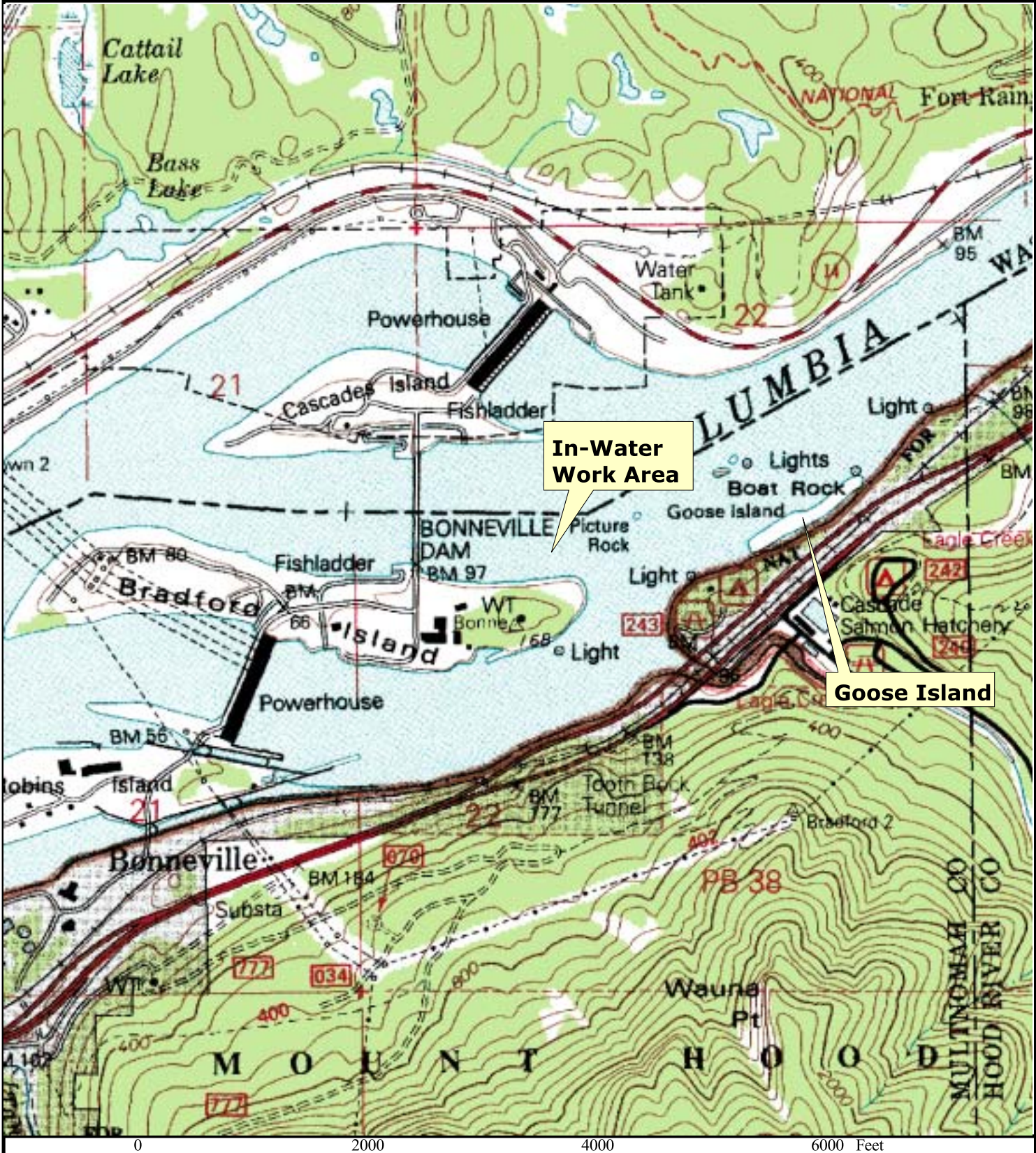
**TABLE 5-3**  
**Electrical Equipment Sampling Results**

Equipment Type	Concentration of PCBs	Aroclor	Solid/Liquid?
<b>Current Results (this investigation)</b>			
Oil filled switches	0.15 mg/L	Aroclor 1268	Liquid
Long black rectangle ballast	1,900 mg/kg	Aroclor 1254	Solid
Jefferson Mercury light ballast	1.0 mg/kg	Aroclor 1254	Solid
Grey dome ballast	330 mg/kg	Aroclor 1248	Solid
Coupling Capacitor	980 mg/kg	Aroclor 1254	Grease like
Silver finned ballast	340 mg/kg	Aroclor 1254	Solid
<b>Previous Results (from December 2000)</b>			
Inerteen Capacitor	20 percent	Aroclor 1254	Liquid
Coupling Capacitor	1.99 mg/kg	Aroclor 1254	Grease like
Lighting Ballast	258 mg/kg	Aroclor 1254	Solid
Lightening Arrestor (felt)	6.35 mg/kg	Aroclor 1254	Solid

# FIGURES

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Project Number: 52-00080001.07 00001

Date: January 2, 2002

PDX, K:\bradford\_island\apr\bradford\_Jan02.apr

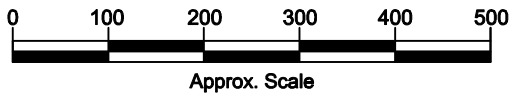
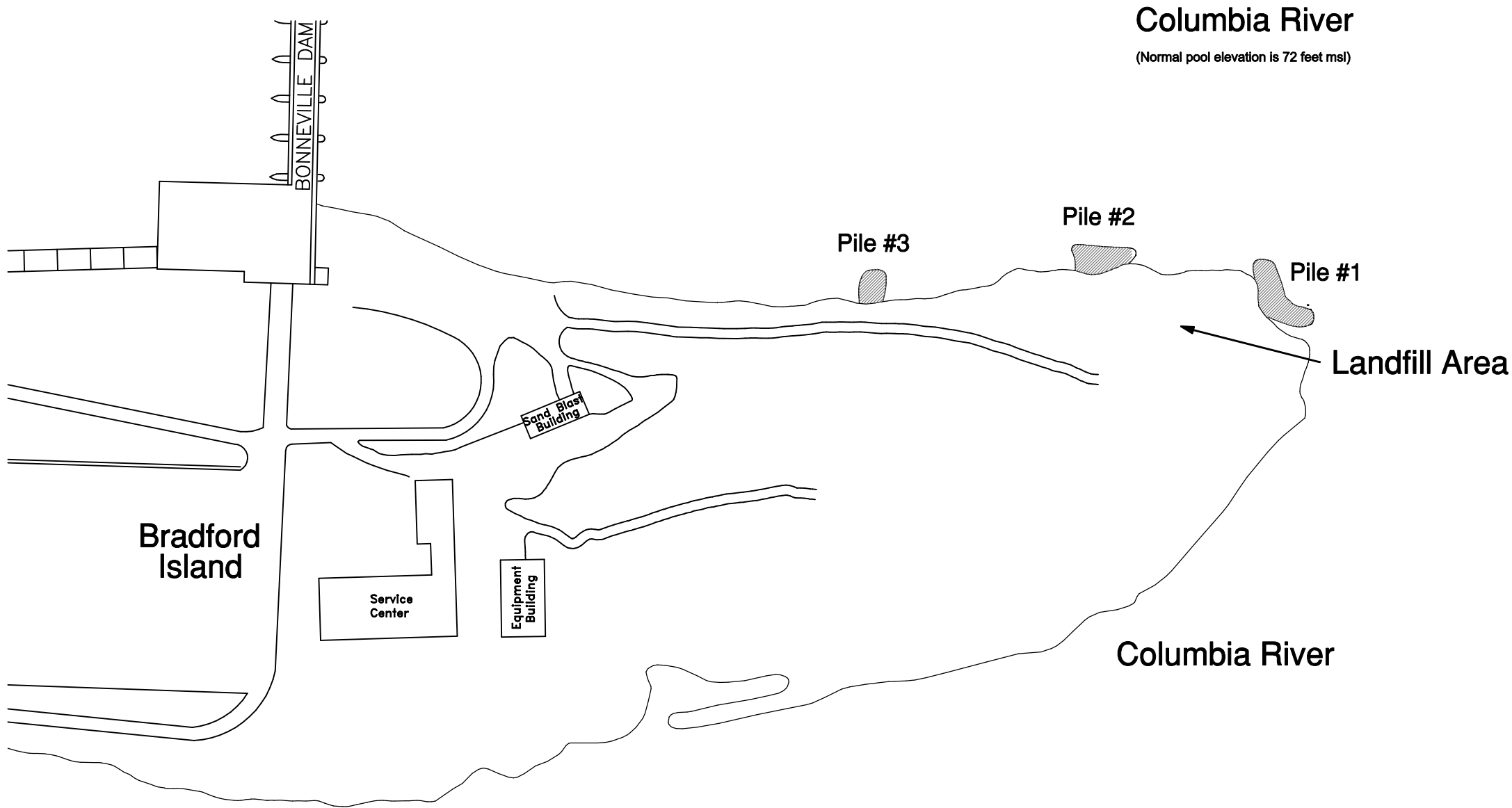


**Figure 2-1**

**Vicinity Map  
Bradford Island  
Cascade Locks, OR**

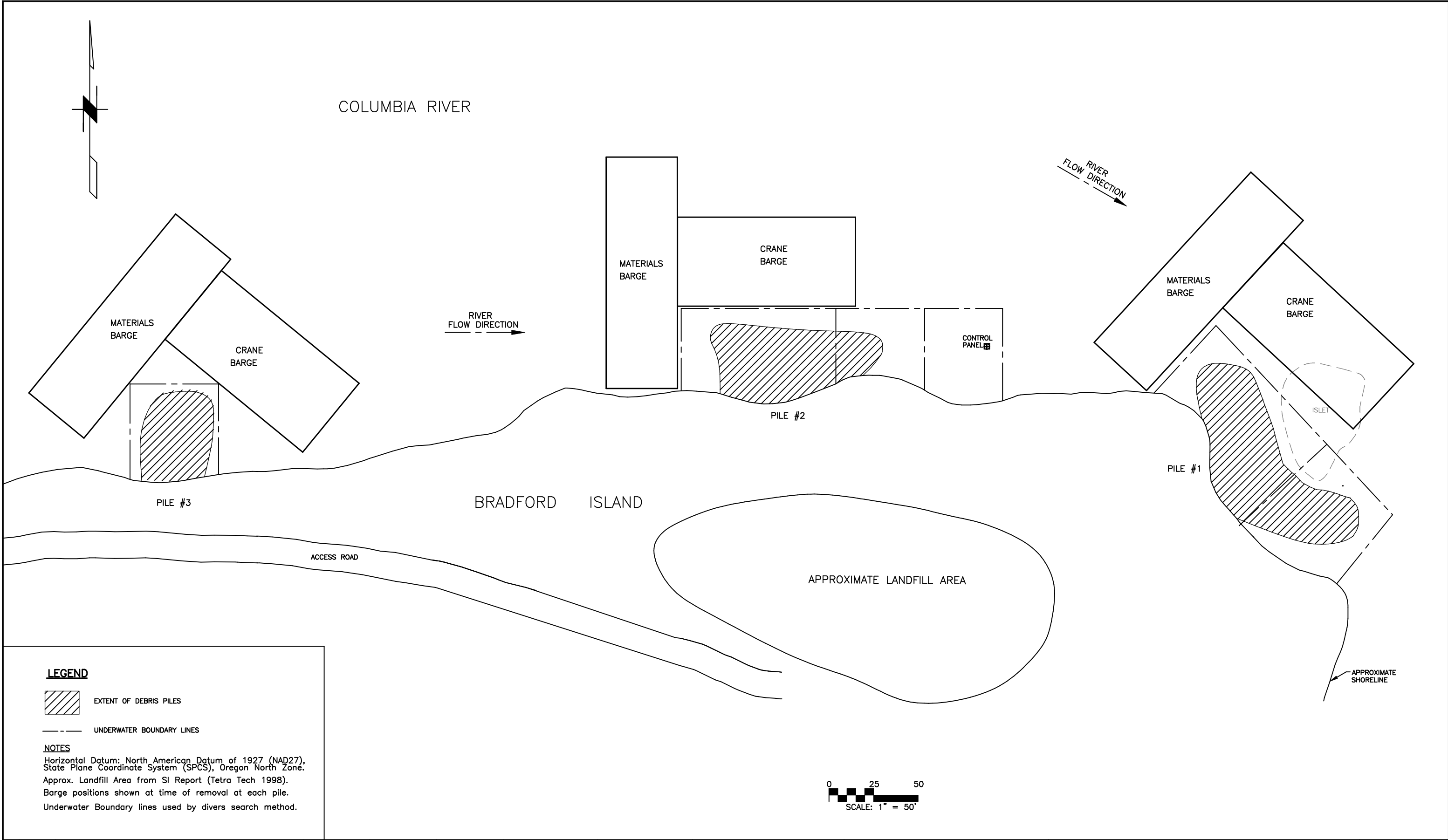


.\53-F0072173.00 Brdford\Delivery Order No. 07\FSP\FIGURE 2-2 r14.dwg Apr 24, 2002 - 2:34pm



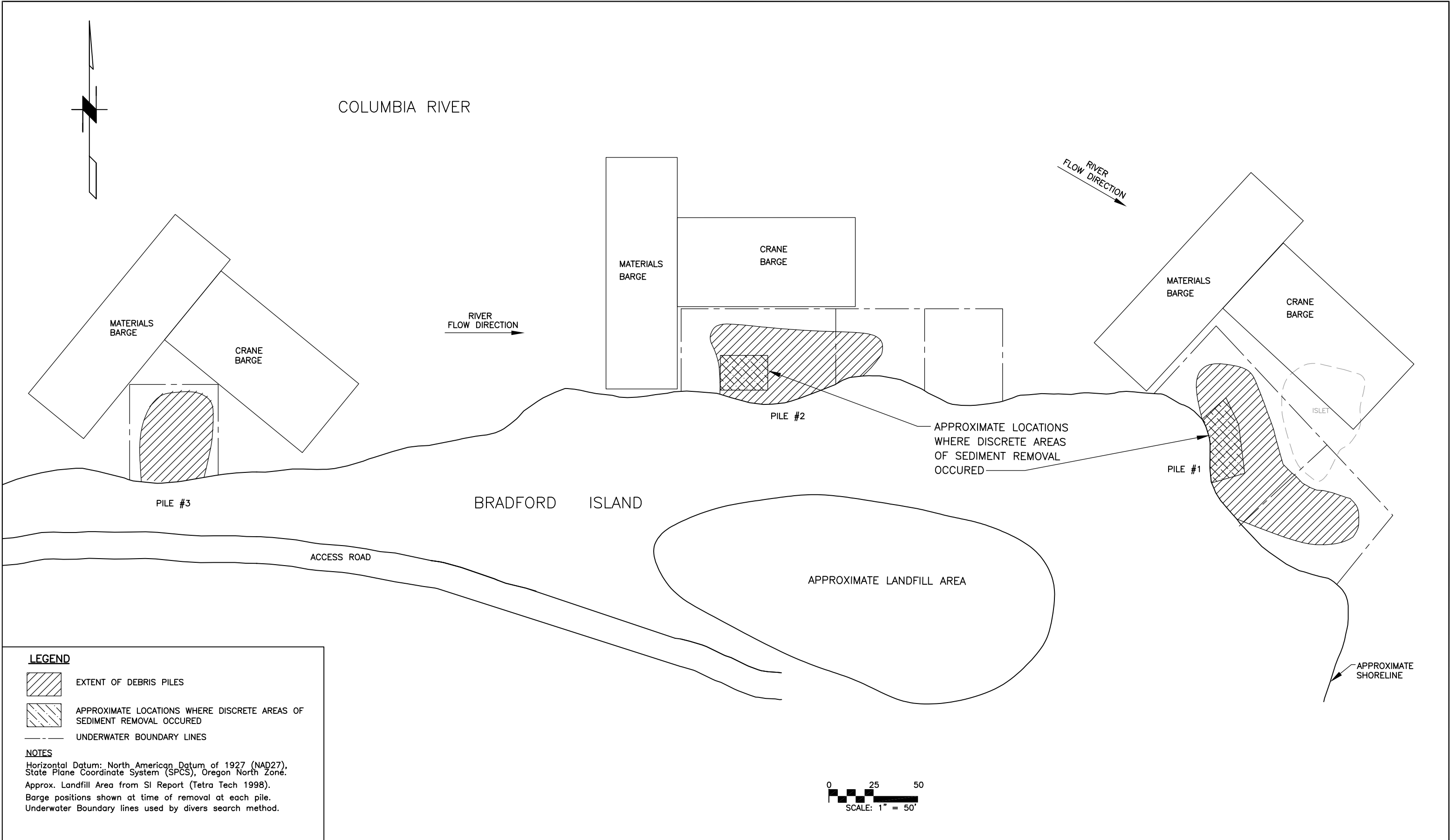
				JOB No. 53-F	DESIGNED: CM	PROJ. ENGINEER: .			<b>URS</b>  111 S.W. Columbia, Suite 900 Portland, Oregon 97201 (tel) 503-222-7200 (fax) 503-222-4292	BRADFORD ISLAND LANDFILL	PROJECT AREA MAP	DRAWING NUMBER: FIGURE 2-2	
				SCALE:	DRAWN BY: JMP	APPROVED BY: JW				CASCADE LOCKS, OREGON		CAD FILE NUMBER: FIGURE 2-2	
					CHECKED BY: CM	DATE: 4/17/02						SHEET: OF	REV.
No.	DATE	BY	REVISION										


I:\52-00080001.00 USACE\CAD\Figure-1REMOVAL.dwg Apr 24, 2002 - 2:38pm



				JOB No. 52-00080001.07	DESIGNED: CM	PROJ. ENGINEER:			<b>URS</b>  111 S.W. Columbia, Suite 900 Portland, Oregon 97201 (tel) 503-222-7200 (fax) 503-222-4292	BRADFORD ISLAND LANDFILL	REMOVAL SITE PLAN	DRAWING NUMBER: FIGURE 3-1	
				SCALE:  AS SHOWN	DRAWN BY: JMP	APPROVED BY: JW				CASCADE LOCKS, OREGON		CAD FILE NUMBER: FIGURE 3-1	
No.	DATE	BY	REVISION		CHECKED BY: CM	DATE: 4/17/02						SHEET: OF	REV.

O:\25692709 USACE\53-F0072173.00 Brdford1\Delivery Order No. 08\Final Removal Report\Figure-4-1REMOVAL.dwg Oct 10, 2002 - 1:06pm



				JOB No. 25692709.00020	DESIGNED: CM	PROJ. ENGINEER:			  111 S.W. Columbia, Suite 900 Portland, Oregon 97201 (tel) 503-222-7200 (fax) 503-222-4292	BRADFORD ISLAND LANDFILL	SEDIMENT REMOVAL LOCATIONS	DRAWING NUMBER: FIGURE 4-1	
				SCALE:  AS SHOWN	DRAWN BY: JMP	APPROVED BY: JW				CASCADE LOCKS, OREGON		CAD FILE NUMBER: FIGURE 4-1	
					CHECKED BY: CM	DATE: 10/04/02							SHEET: OF
No.	DATE	BY	REVISION										



**BRADFORD ISLAND IN WATER WORK PLAN****Amendments****1. Current Operation Technical Difficulties.**

ESA consultation with National Marine Fisheries Service and the United States Fish and Wildlife Service resulted in a work plan that included the installation of a silt screen around the perimeter of each of the 3 removal sites. Installation of the silt screens began on 11 February 2002 with pile number 3. Wind and current conditions at the site made deployment very difficult. Several attempts were made. The final attempt included 200 pound anchors, placed on the river bottom every 5 feet. These would be used to secure the bottom of the screen. The top line for the screen was anchored to the shoreline with a large boulder and on the river end with a 3,000 pound anchor. Once all anchors were set, the first section of screen was deployed. As it was being placed in the water, it began to unfurl like a giant sail and dragged the boulder off the shore. The top of the screen then disappeared underwater.

There are several problems with the screen concept. The fabric is not porous enough to pass water. (If it were more porous it would not trap sediments.) Also, there are not enough anchor points for the top of the screen. (One on each end is not enough.) It is unlikely that any kind of temporary structure such as this screen fabric could be utilized in this environment. If an anchor system that could hold the tremendous forces was designed, the fabric would tear.

**2. Absence of the Silt Screen, Biological Assessment.**

The purpose of the silt screen was to provide a barrier or engineering control whereby particulates in the water column would be retained inside. Turbidity monitoring, once every hour, was to be accomplished to verify that this engineering control was working. While the loss of the silt screen makes the job more difficult, a change in the turbidity monitoring plan to a real time method plus more conservative handling of the items can be substituted as the engineering controls. That is, if turbidity readings in the immediate area are within required tolerances, the impacts have been avoided to the same degree.

Past sampling efforts have shown that the dissolved phase and particulate phase PCBs do not move downstream after a disturbance, including during spill conditions (see May 2001 SPMD results). Therefore if local movement of the contaminants through turbidity monitoring can be controlled, the effects to the listed species and the overall environment should not be increased.


**3. Additional Measures to be Implemented.**

Turbidity monitoring immediately up-current (for background) and down-current of the work site will be implemented. The down-current monitoring will be continuous, unless a background reading is needed. Both locations will be within 50-75 feet of the location of the divers. The divers will control their movement and disturbance of the sediments to the maximum extent possible. The hoist basket shall be lined with a felt like material and the basket hoisted at a slow speed in order to minimize the distribution of sediments into the water column.

**4. New Action/Coordination Plan.**


The same action level of 5 NTUs above background would be utilized. A background sample would be taken at the start of the day. Continuous monitoring of the down-current location would be accomplished. If at any time the down-current reading exceeds the background reading by more than 5 NTUs, the background reading will be rechecked. If it is determined that the removal effort is the cause of the higher reading, activity will be suspended or slowed until within the allowed levels. A more intensive communication plan will also be implemented. Each days results will be forwarded to the action agencies to determine whether the removal effort is should continue as amended or whether further discussion or modifications are in order.



<b>Client Name:</b> United States Army Corps of Engineers		<b>Site Location:</b> Bradford Island	<b>Project No.</b> 52-00080001.08
<b>Photo No.</b> 1			
<b>Direction Photo Taken:</b>  NA			
<b>Description:</b>  Bagged capacitor and coupling capacitors.			


<b>Photo No.</b> 2			
<b>Direction Photo Taken:</b>  NA			
<b>Description:</b>  Solenoid.			




<b>Client Name:</b> United States Army Corps of Engineers		<b>Site Location:</b> Bradford Island	<b>Project No.</b> 52-00080001.08
<b>Photo No.</b> 3			
<b>Direction Photo Taken:</b> NA			
<b>Description:</b> Ceramic pieces.			

<b>Photo No.</b> 4			
<b>Direction Photo Taken:</b> NA			
<b>Description:</b> Motor winding.			




<b>Client Name:</b> United States Army Corps of Engineers		<b>Site Location:</b> Bradford Island	<b>Project No.</b> 52-00080001.08
<b>Photo No.</b> 5			
<b>Direction Photo Taken:</b> NA			
<b>Description:</b> "Black Box" ballast.			

<b>Photo No.</b> 6			
<b>Direction Photo Taken:</b> NA			
<b>Description:</b> Broken lightning arrester in bin.			

<b>Client Name:</b> United States Army Corps of Engineers		<b>Site Location:</b> Bradford Island	<b>Project No.</b> 52-00080001.08
<b>Photo No.</b> 7			
<b>Direction Photo Taken:</b>  NA			
<b>Description:</b>  Bagged capacitors and lightning arrester in box.			


<b>Photo No.</b> 8	
<b>Direction Photo Taken:</b>  NA	
<b>Description:</b>  Closeup of disk inside lightning arrestors.	




<b>Client Name:</b> United States Army Corps of Engineers		<b>Site Location:</b> Bradford Island	<b>Project No.</b> 52-00080001.08
<b>Photo No.</b> 9			
<b>Direction Photo Taken:</b> NA			
<b>Description:</b>  Inerteen capacitors.			

<b>Photo No.</b> 10			
<b>Direction Photo Taken:</b>  NA			
<b>Description:</b>  Side view inerteen capacitor.			




<b>Client Name:</b> United States Army Corps of Engineers		<b>Site Location:</b> Bradford Island	<b>Project No.</b> 52-00080001.08
<b>Photo No.</b> 11			
<b>Direction Photo Taken:</b> NA			
<b>Description:</b>  Closeup of label from an interteem capacitor.			

<b>Photo No.</b> 12			
<b>Direction Photo Taken:</b> NA			
<b>Description:</b>  Light ballast.			

<b>Client Name:</b> United States Army Corps of Engineers		<b>Site Location:</b> Bradford Island	<b>Project No.</b> 52-00080001.08
<b>Photo No.</b> 13			
<b>Direction Photo Taken:</b>  NA			
<b>Description:</b>  Light ballast.			


<b>Photo No.</b> 14			
<b>Direction Photo Taken:</b>  NA			
<b>Description:</b>  Control panel.			



<b>Client Name:</b> United States Army Corps of Engineers		<b>Site Location:</b> Bradford Island	<b>Project No.</b> 52-00080001.08
<b>Photo No.</b> 15			
<b>Direction Photo Taken:</b> NA			
<b>Description:</b> Top view of a coupling capacitor.			


<b>Photo No.</b> 16			
<b>Direction Photo Taken:</b> NA			
<b>Description:</b> Switch.			



<b>Client Name:</b> United States Army Corps of Engineers		<b>Site Location:</b> Bradford Island	<b>Project No.</b> 52-00080001.08
<b>Photo No.</b> 17			
<b>Direction Photo Taken:</b>  NA			
<b>Description:</b>  Oil-filled switches.			


<b>Photo No.</b> 18	
<b>Direction Photo Taken:</b>  NA	
<b>Description:</b>  Mercury light ballast.	



<b>Client Name:</b> United States Army Corps of Engineers		<b>Site Location:</b> Bradford Island	<b>Project No.</b> 52-00080001.08
<b>Photo No.</b> 19			
<b>Direction Photo Taken:</b> NA			
<b>Description:</b> Opened oil-filled switch.			


<b>Photo No.</b> 20	
<b>Direction Photo Taken:</b> NA	
<b>Description:</b> Miscellaneous metal and lightning arrestor.	




<b>Client Name:</b> United States Army Corps of Engineers		<b>Site Location:</b> Bradford Island	<b>Project No.</b> 52-00080001.08
<b>Photo No.</b> 21			
<b>Direction Photo Taken:</b>  NA			
<b>Description:</b>  Communication boxes and post insulator.			

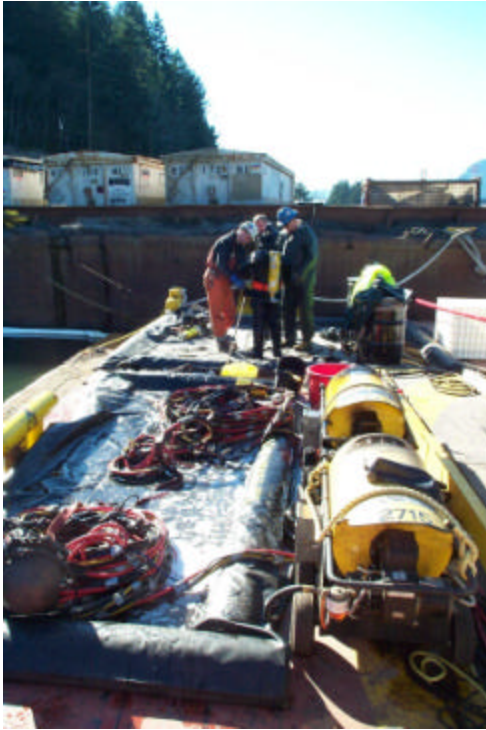
<b>Photo No.</b> 22			
<b>Direction Photo Taken:</b>  NA			
<b>Description:</b>  Electric meter.			




<b>Client Name:</b> United States Army Corps of Engineers		<b>Site Location:</b> Bradford Island	<b>Project No.</b> 52-00080001.08
<b>Photo No.</b> 23			
<b>Direction Photo Taken:</b> West			
<b>Description:</b> Barge set up on Pile #1.			

<b>Photo No.</b> 24	<b>Date:</b>	
<b>Direction Photo Taken:</b> West		
<b>Description:</b> Barge set up on Pile #2.		


<b>Client Name:</b> United States Army Corps of Engineers		<b>Site Location:</b> Bradford Island	<b>Project No.</b> 52-00080001.08
<b>Photo No.</b> 25			
<b>Direction Photo Taken:</b>  East			
<b>Description:</b>  Barge set up on Pile #3.			

<b>Photo No.</b> 26			
<b>Direction Photo Taken:</b>  West			
<b>Description:</b>  Diver decon area and materials barge in background.			




<b>Client Name:</b> United States Army Corps of Engineers		<b>Site Location:</b> Bradford Island	<b>Project No.</b> 52-00080001.08
<b>Photo No.</b> 27			
<b>Direction Photo Taken:</b>  South			
<b>Description:</b>  Sediment removal at Pile #1.			

<b>Photo No.</b> 28			
<b>Direction Photo Taken:</b>  Southeast			
<b>Description:</b>  Crane barge and tug taken from materials barge.			


<b>Client Name:</b> United States Army Corps of Engineers		<b>Site Location:</b> Bradford Island	<b>Project No.</b> 52-00080001.08
<b>Photo No.</b> 29			
<b>Direction Photo Taken:</b>  East			
<b>Description:</b>  Placing anchors at Pile #1.			

<b>Photo No.</b> 30			
<b>Direction Photo Taken:</b>  Northeast			
<b>Description:</b>  Placement of oil boom at Pile #1.			




<b>Client Name:</b> United States Army Corps of Engineers		<b>Site Location:</b> Bradford Island	<b>Project No.</b> 52-00080001.08
<b>Photo No.</b> 31			
<b>Direction Photo Taken:</b>  NA			
<b>Description:</b>  Closeup of lined wire basket and goody bag.			

<b>Photo No.</b> 32			
<b>Direction Photo Taken:</b>  East			
<b>Description:</b>  Crane used to place wire basket on barge for unloading.			

<b>Client Name:</b> United States Army Corps of Engineers		<b>Site Location:</b> Bradford Island	<b>Project No.</b> 52-00080001.08
<b>Photo No.</b> 33			
<b>Direction Photo Taken:</b>  South			
<b>Description:</b>  Placing turbidity probe in water.			

<b>Photo No.</b> 34			
<b>Direction Photo Taken:</b>  Northwest			
<b>Description:</b>  Closeup of turbidity meter and monitoring.			



<b>Client Name:</b> United States Army Corps of Engineers		<b>Site Location:</b> Bradford Island	<b>Project No.</b> 52-00080001.08
<b>Photo No.</b> 35			
<b>Direction Photo Taken:</b>  East			
<b>Description:</b>  Turbidity monitoring at Pile #1.			



Six surface water samples and one field duplicate sample were collected by URS on February 20, 2002 through March 4, 2002 at the Bradford Island site in Cascade Locks, Oregon as part of the Bradford Island In Water Removal Work. The analytical results for the water samples were subjected to a quality assurance/quality control (QA/QC) review. This QA/QC review includes evaluation of representativeness (degree to which the sample represents the environmental condition), accuracy (spike and/or standard recoveries), analytical precision (duplicate relative percent difference), comparability (use of standard methods) and completeness (percent of usable data). This review addresses only those problems that affect data usability.

The data quality review process followed the procedures outlined in the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* (USEPA, October 1999) and *Inorganic Data Review* (USEPA, February 1994), where applicable. No raw data were reviewed and no results were recalculated.

Samples were collected according to the Bradford Island Removal Work Sampling and Analysis Plan (SAP) (URS, 2001). Surface water samples were collected in four one-liter glass amber bottles and submitted to Severn Trent Laboratories – Seattle, Inc., (STL) (formerly Sound Analytical Resources, Inc.) located in Tacoma, Washington. The laboratory analyzed the samples for total organic carbon (TOC) via method 9060 before the sample was filtered. Next, the laboratory filtered the samples through a 0.7-micron glass filter. The water that passed through the filter was analyzed for polychlorinated biphenyls (PCBs) by EPA Method 8082 (dissolved PCBs) and organic carbon by EPA Method 9060 [dissolved organic carbon (DOC)]. The filter and the particulates captured by the filter were extracted and analyzed for PCBs by EPA Method 8082 (particulate PCBs).

Table C-1 summarizes qualifiers added to the data. Final sample results and qualifiers are presented in Table C-2.

## REPRESENTATIVENESS

### Chain-of-Custody and Holding Times

The chain-of-custody (COC) forms were signed upon release and receipt. The laboratory cooler receipt form indicates that custody seals were not attached to coolers containing samples 020223IW02WC, 020226IW03WC, 020227IW04WC, 020228IW05WC and 020228IW06WC upon arrival at the laboratory. Sample results were not qualified due to this nonconformance.

All coolers were submitted at temperatures within  $4^{\circ}\text{C} \pm 2^{\circ}\text{C}$ . PCB analyses were conducted within the technical and contracted holding time. The total and dissolved organic carbon analyses were conducted outside the technical holding time of four hours for unpreserved samples. All samples and were qualified as estimated (J).

**Review of Narrative**

The laboratory noted that the cap for the separatory funnel used to extract sample 020228IW05WC for dissolved PCB analysis leaked, resulting in a small loss of sample and solvent. The amount lost was not quantified. The sample surrogate recoveries were within criteria; therefore, data were not qualified.

The DOC results may not be representative of the conditions in the water column. The DOC results are higher than the TOC results indicating that the DOC results are likely artificially elevated. Although a filter blank was not prepared, the laboratory noted that the DOC may have picked up carbon from the filtering process; either from the filter or handling of the filter.

**Review of Blanks**

Method blanks were used to check for laboratory contamination and instrument bias. The laboratory analyzed at least one method blank for each analysis and for each batch, per method requirements. Target compounds were not detected in the method blanks.

The samples were collected with dedicated equipment; therefore an equipment blank was not collected.

**ACCURACY****Instrument Calibration**

The laboratory performed initial multipoint calibrations for all target and surrogate compounds as required by EPA Method 8082. Initial calibrations and continuing calibrations were analyzed at the proper frequency and at the appropriate concentrations. Percent relative standard deviation values were less than 20% and percent differences were less than 25%.

**Surrogate Recovery Review**

Each sample analyzed for PCBs was spiked with surrogates (system monitoring compounds). Surrogate recoveries are a measure of accuracy for the overall analysis of each individual sample. Surrogate recoveries were within the acceptance criteria of 50 to 150% with one exception:

- Surrogates decachlorobiphenyl and tetrachloro-m-xylene for sample 020220IW01WC exhibited recovery less than the acceptance criteria indicating a potential low bias. The sample results were non-detect and were qualified as estimated (UJ).

**Laboratory Control Samples and Matrix Spike/Matrix Spike Duplicate Review**

Laboratory control samples (LCS) are used to monitor the laboratory's day-to-day performance of routine analytical methods, independent of matrix effects and to assess accuracy for the target

compounds. LCS spike recoveries were within the acceptance criteria of 50–130% for PCBs and 90–115% for DOC and TOC.

Matrix spike/matrix spike duplicate (MS/MSD) samples are analyzed to assess the ability of the laboratory to recover the target compounds from the sample matrix. MS/MSD spike recoveries were within the acceptance criteria of 50–150% for PCBs and 80–120% for DOC and TOC. The relative percent difference was less than the acceptance criteria of 50% for both analyses.

## PRECISION

### Second Column Confirmation

Second column confirmation was performed for all PCB and pesticide results. All PCB sample analyses exhibited an RPD  $\leq$  40% between the first and second column.

### Duplicate Review

One field duplicate (020228IW05WC and 020228IW06WC) was collected to verify acceptable field sampling techniques and the representativeness of the sample aliquots. The field duplicate frequency meets the project requirement of ten percent. The results and relative percent differences for detected analytes are presented in the table below. The RPD is not calculated when the sample results are less than five times the reporting limits, as indicated on the table with a NC (not calculated) in the RPD column.

ANALYTE	UNITS	020228IW05WC PRIMARY RESULT	020228IW06WC DUPLICATE RESULT	RELATIVE PERCENT DIFFERENCE
<b>011016BIL11SS/011016BIL12SS</b>				
PCB Aroclor 1254 (particulate)	µg/L	0.0186	0.00487 U	NC
PCB Aroclor 1260 (particulate)	µg/L	0.00491 U	0.0347	NC
DOC	mg/L	1.89	1.83	3
TOC	mg/L	1.7	2.4	34

NC – Not Calculated

The laboratory reported detections of two different PCB Aroclors (Aroclors 1254 and 1260) in the primary and field duplicate samples. PCBs detected in the water column may be weathered, and therefore exhibit less recognizable patterns than the standard, which may account for the Aroclor identification disagreement. The primary and field duplicate Aroclor results were qualified as estimated (J).

## COMPARABILITY

### Reporting Limits

The sensitivity (i.e., reporting limits) of the analytical methods is driven by the project specific DQOs. The reporting limits for all samples were below the project specific benchmark value for PCBs; the ambient water quality criteria of 0.014 µg/L.

## COMPLETENESS

The laboratory reported all requested analyses and the deliverable data reports were adequate for review. Completeness is defined as the percentage of usable data out of the total amount of data generated. The project completeness goal of 100 percent was attained.

**TABLE C-1**  
**Summary Of Data Qualification**

QUALIFIED SAMPLE ID	QUALIFIED ANALYTE(S)	QUALIFIER	ANALYTICAL DEVIATIONS
020220IW01WC	All PCB Aroclors - Dissolved	UJ	Surrogate recovery < 50%
	TOC and DOC	J	Outside of technical hold time
020223IW02WC	TOC and DOC	J	Outside of technical hold time
020226IW03WC	TOC and DOC	J	Outside of technical hold time
020227IW04WC	TOC and DOC	J	Outside of technical hold time
020228IW05WC	PCB Aroclor 1254 - Particulate	J	Laboratory reported Aroclor 1260 in the field duplicate
	TOC and DOC	J	Outside of technical hold time
020228IW06WC (Field duplicate)	PCB Aroclor 1260 - Particulate	J	Laboratory reported Aroclor 1254 in the primary sample
	TOC and DOC	J	Outside of technical hold time
020304IW07WC	TOC and DOC	J	Outside of technical hold time

### Notes:

ID - identification

J - The associated numerical value is an estimate.

UJ - The analyte was not detected above the reported, estimated sample quantitation limit.



# STL Seattle

Client Name	URS Corporation
Client ID:	020220IW01WC
Lab ID:	104149-01
Date Received:	2/22/02
Date Prepared:	2/25/02
Date Analyzed:	2/26/02
% Solids	-
Dilution Factor	1

## PCBs by USEPA Method 8082

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tetrachloro-m-xylene	43		40	99
Decachlorobiphenyl	31.6	N	44	123

Analyte	Result (ug/L)	PQL	MDL	Flags
Aroclor 1016	ND	0.005	0.00101	
Aroclor 1221	ND	0.01	0.0025	
Aroclor 1232	ND	0.005	0.00119	
Aroclor 1242	ND	0.005	0.00165	
Aroclor 1248	ND	0.005	0.00078	
Aroclor 1254	ND	0.005	0.00101	
Aroclor 1260	ND	0.005	0.00055	

mw 3/26/02



# STL Seattle

Client Name	URS Corporation
Client ID:	
Lab ID:	104149X01
Date Received:	-
Date Prepared:	2/25/02
Date Analyzed:	2/28/02
% Solids	-
Dilution Factor	1

## PCBs by USEPA Method 8082

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tetrachloro-m-xylene	46.5		40	99
Decachlorobiphenyl	39.6	N	44	123

Analyte	Result (ug/L)	PQL	MDL	Flags
Aroclor 1016	ND	0.005	0.00101	
Aroclor 1221	ND	0.01	0.0025	
Aroclor 1232	ND	0.005	0.00119	
Aroclor 1242	ND	0.005	0.00165	
Aroclor 1248	ND	0.005	0.00078	
Aroclor 1254	ND	0.005	0.00101	
Aroclor 1260	ND	0.005	0.00055	

nd

Use 2/26/02 analysis

# STL Seattle

Client Name	URS Corporation
Client ID:	020220IW01WC
Lab ID:	104149-02
Date Received:	2/22/02
Date Prepared:	3/5/02
Date Analyzed:	3/7/02
% Solids	-
Dilution Factor	1

## PCBs by USEPA Method 8082 - from Particulate Captured on Filter

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tetrachloro-m-xylene	76.2		50	130
Decachlorobiphenyl	88.1		50	130

Analyte	Result (ug/L)	PQL	MDL	Flags
Aroclor 1016	ND	0.005	0.00101	
Aroclor 1221	ND	0.01	0.0025	
Aroclor 1232	ND	0.005	0.00119	
Aroclor 1242	ND	0.005	0.00165	
Aroclor 1248	ND	0.005	0.00078	
Aroclor 1254	ND	0.005	0.00101	
Aroclor 1260	ND	0.005	0.00055	



# STL Seattle

Client Name	URS Corporation
Client ID:	020220IW01WC
Lab ID:	104149-01
Date Received:	2/22/02
Date Prepared:	2/27/02
Date Analyzed:	2/27/02
% Solids	-
Dilution Factor	1

## Dissolved Organic Carbon by USEPA Method 9060

Analyte	Result (mg/L)	PQL	MDL	Flags
DOC	8.19 $\bar{J}$	0.5	0.35	

mw 3/26/02

# STL Seattle

Client Name	URS Corporation
Client ID:	020223IW02WC
Lab ID:	104230-01
Date Received:	2/26/02
Date Prepared:	2/28/02
Date Analyzed:	3/4/02
% Solids	-
Dilution Factor	1

## PCBs by USEPA Method 8082

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tetrachloro-m-xylene	56.4		40	99
Decachlorobiphenyl	60.6		44	123

Analyte	Result (ug/L)	PQL	MDL	Flags
Aroclor 1016	ND	0.005	0.00101	
Aroclor 1221	ND	0.01	0.0025	
Aroclor 1232	ND	0.005	0.00119	
Aroclor 1242	ND	0.005	0.00165	
Aroclor 1248	ND	0.005	0.00078	
Aroclor 1254	ND	0.005	0.00101	
Aroclor 1260	ND	0.005	0.00055	



# STL Seattle

Client Name	URS Corporation
Client ID:	020223IW02WC
Lab ID:	104230-02
Date Received:	2/26/02
Date Prepared:	3/5/02
Date Analyzed:	3/6/02
% Solids	-
Dilution Factor	1

## PCBs by USEPA Method 8082 - from Particulate Captured on Filter

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tetrachloro-m-xylene	70.1		50	130
Decachlorobiphenyl	94.5		50	130

Analyte	Result (ug/L)	PQL	MDL	Flags
Aroclor 1016	ND	0.005	0.00101	
Aroclor 1221	ND	0.01	0.0025	
Aroclor 1232	ND	0.005	0.00119	
Aroclor 1242	ND	0.005	0.00165	
Aroclor 1248	ND	0.005	0.00078	
Aroclor 1254	ND	0.005	0.00101	
Aroclor 1260	ND	0.005	0.00055	

# STL Seattle

Client Name	URS Corporation
Client ID:	020223IW02WC
Lab ID:	104230-01
Date Received:	2/26/02
Date Prepared:	3/6/02
Date Analyzed:	3/6/02
% Solids	-
Dilution Factor	1

## Dissolved Organic Carbon by USEPA Method 9060

Analyte	Result (mg/L)	PQL	MDL	Flags
DOC	2.48 J	0.5	0.35	

mw 3/26/02



# STL Seattle

Client Name	URS Corporation
Client ID:	020223IW02WC
Lab ID:	104230-01
Date Received:	2/26/02
Date Prepared:	3/6/02
Date Analyzed:	3/6/02
% Solids	-
Dilution Factor	1

## Total Organic Carbon by USEPA Method 9060

Analyte	Result (mg/L)	PQL	MDL	Flags
TOC	2.05 J	0.5	0.35	

MW 3/26/02

# STL Seattle

Client Name	URS Corporation
Client ID:	020226IW03WC
Lab ID:	104285-01
Date Received:	2/28/02
Date Prepared:	3/4/02
Date Analyzed:	3/5/02
% Solids	-
Dilution Factor	1

## PCBs by USEPA Method 8082

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tetrachloro-m-xylene	74.3		40	99
Decachlorobiphenyl	86.7		44	123

Analyte	Result (ug/L)	PQL	MDL	Flags
Aroclor 1016	ND	0.00481	0.000966	
Aroclor 1221	ND	0.00962	0.0024	
Aroclor 1232	ND	0.00481	0.00114	
Aroclor 1242	ND	0.00481	0.00159	
Aroclor 1248	ND	0.00481	0.00075	
Aroclor 1254	ND	0.00481	0.000966	
Aroclor 1260	ND	0.00481	0.000529	



# STL Seattle

Client Name	URS Corporation
Client ID:	020226IW03WC
Lab ID:	104285-02
Date Received:	2/28/02
Date Prepared:	3/5/02
Date Analyzed:	3/7/02
% Solids	-
Dilution Factor	1

## PCBs by USEPA Method 8082 - from Particulate Captured on Filter

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tetrachloro-m-xylene	68.9		50	130
Decachlorobiphenyl	110		50	130

Analyte	Result (ug/L)	PQL	MDL	Flags
Aroclor 1016	ND	0.00481	0.000966	
Aroclor 1221	ND	0.00962	0.0024	
Aroclor 1232	ND	0.00481	0.00114	
Aroclor 1242	ND	0.00481	0.00159	
Aroclor 1248	ND	0.00481	0.00075	
Aroclor 1254	ND	0.00481	0.000966	
Aroclor 1260	ND	0.00481	0.000529	

# STL Seattle

Client Name	URS Corporation
Client ID:	020226IW03WC
Lab ID:	104285-01
Date Received:	2/28/02
Date Prepared:	3/13/02
Date Analyzed:	3/13/02
% Solids	-
Dilution Factor	1

## Dissolved Organic Carbon by USEPA Method 9060

Analyte	Result (mg/L)	PQL	MDL	Flags
DOC	3.52 J	0.5	0.35	

mn 3/26/02



# STL Seattle

Client Name	URS Corporation
Client ID:	020226IW03WC
Lab ID:	104285-01
Date Received:	2/28/02
Date Prepared:	3/8/02
Date Analyzed:	3/8/02
% Solids	-
Dilution Factor	1

## Total Organic Carbon by USEPA Method 9060

Analyte	Result (mg/L)	PQL	MDL	Flags
TOC	1.91 J	0.5	0.35	

mw 3/26/02

# STL Seattle

Client Name	URS Corporation
Client ID:	020227IW04WC
Lab ID:	104312-01
Date Received:	3/1/02
Date Prepared:	3/4/02
Date Analyzed:	3/5/02
% Solids	-
Dilution Factor	1

## PCBs by USEPA Method 8082

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tetrachloro-m-xylene	59.1		40	99
Decachlorobiphenyl	59.1		44	123

Analyte	Result (ug/L)	PQL	MDL	Flags
Aroclor 1016	ND	0.00488	0.00098	
Aroclor 1221	ND	0.00975	0.00244	
Aroclor 1232	ND	0.00488	0.00116	
Aroclor 1242	ND	0.00488	0.00161	
Aroclor 1248	ND	0.00488	0.000761	
Aroclor 1254	ND	0.00488	0.00098	
Aroclor 1260	ND	0.00488	0.000536	



# STL Seattle

Client Name	URS Corporation
Client ID:	020227IW04WC
Lab ID:	104312-02
Date Received:	3/1/02
Date Prepared:	3/5/02
Date Analyzed:	3/7/02
% Solids	-
Dilution Factor	1

## PCBs by USEPA Method 8082 - from Particulate Captured on Filter

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tetrachloro-m-xylene	77.6		50	130
Decachlorobiphenyl	93.6		50	130

Analyte	Result (ug/L)	PQL	MDL	Flags
Aroclor 1016	ND	0.00488	0.00098	
Aroclor 1221	ND	0.00975	0.00244	
Aroclor 1232	ND	0.00488	0.00116	
Aroclor 1242	ND	0.00488	0.00161	
Aroclor 1248	ND	0.00488	0.000761	
Aroclor 1254	ND	0.00488	0.00098	
Aroclor 1260	ND	0.00488	0.000536	



# STL Seattle

Client Name	URS Corporation
Client ID:	020227IW04WC
Lab ID:	104312-01
Date Received:	3/1/02
Date Prepared:	3/13/02
Date Analyzed:	3/13/02
% Solids	-
Dilution Factor	1

## Dissolved Organic Carbon by USEPA Method 9060

Analyte	Result (mg/L)	PQL	MDL	Flags
DOC	4.2 J	0.5	0.35	

MN 3/26/02

# STL Seattle

Client Name	URS Corporation
Client ID:	020227IW04WC
Lab ID:	104312-01
Date Received:	3/1/02
Date Prepared:	3/8/02
Date Analyzed:	3/8/02
% Solids	-
Dilution Factor	1

## Total Organic Carbon by USEPA Method 9060

Analyte	Result (mg/L)	PQL	MDL	Flags
TOC	2.44 J	0.5	0.35	

mn 3/26/02



# STL Seattle

Client Name	URS Corporation
Client ID:	020228IW05WC
Lab ID:	104336-01
Date Received:	3/2/02
Date Prepared:	3/4/02
Date Analyzed:	3/5/02
% Solids	-
Dilution Factor	1

## PCBs by USEPA Method 8082

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tetrachloro-m-xylene	56.8		40	99
Decachlorobiphenyl	70.6		44	123

Analyte	Result (ug/L)	PQL	MDL	Flags
Aroclor 1016	ND	0.005	0.001	
Aroclor 1221	ND	0.01	0.0025	
Aroclor 1232	ND	0.005	0.00119	
Aroclor 1242	ND	0.005	0.00165	
Aroclor 1248	ND	0.005	0.00078	
Aroclor 1254	ND	0.005	0.001	
Aroclor 1260	ND	0.005	0.00055	

# STL Seattle

Client Name	URS Corporation
Client ID:	020228IW06WC
Lab ID:	104336-02
Date Received:	3/2/02
Date Prepared:	3/4/02
Date Analyzed:	3/5/02
% Solids	-
Dilution Factor	1

## PCBs by USEPA Method 8082

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tetrachloro-m-xylene	64.4		40	99
Decachlorobiphenyl	82.5		44	123

Analyte	Result (ug/L)	PQL	MDL	Flags
Aroclor 1016	ND	0.005	0.00101	
Aroclor 1221	ND	0.01	0.0025	
Aroclor 1232	ND	0.005	0.00119	
Aroclor 1242	ND	0.005	0.00165	
Aroclor 1248	ND	0.005	0.00078	
Aroclor 1254	ND	0.005	0.00101	
Aroclor 1260	ND	0.005	0.00055	



# STL Seattle

Client Name	URS Corporation
Client ID:	020228IW05WC
Lab ID:	104336-03
Date Received:	3/2/02
Date Prepared:	3/5/02
Date Analyzed:	3/7/02
% Solids	-
Dilution Factor	1

## PCBs by USEPA Method 8082 - from Particulate Captured on Filter

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tetrachloro-m-xylene	63.2		50	130
Decachlorobiphenyl	88.4		50	130

Analyte	Result (ug/L)	PQL	MDL	Flags
Aroclor 1016	ND	0.00491	0.000986	
Aroclor 1221	ND	0.00981	0.00245	
Aroclor 1232	ND	0.00491	0.00117	
Aroclor 1242	ND	0.00491	0.00162	
Aroclor 1248	ND	0.00491	0.000765	
Aroclor 1254	0.0186 J	0.00491	0.000986	C1
Aroclor 1260	ND	0.00491	0.00054	

MN 3/27/02



# STL Seattle

Client Name	URS Corporation
Client ID:	020228IW06WC
Lab ID:	104336-04
Date Received:	3/2/02
Date Prepared:	3/5/02
Date Analyzed:	3/7/02
% Solids	-
Dilution Factor	1

## PCBs by USEPA Method 8082 - from Particulate Captured on Filter

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tetrachloro-m-xylene	75.3		50	130
Decachlorobiphenyl	93.8		50	130

Analyte	Result (ug/L)	PQL	MDL	Flags
Aroclor 1016	ND	0.00487	0.000979	
Aroclor 1221	ND	0.00974	0.00243	
Aroclor 1232	ND	0.00487	0.00116	
Aroclor 1242	ND	0.00487	0.00161	
Aroclor 1248	ND	0.00487	0.000759	
Aroclor 1254	ND	0.00487	0.000979	
Aroclor 1260	0.0347 J	0.00487	0.000536	et

mw 3/27/02

# STL Seattle

Client Name	URS Corporation
Client ID:	020228IW05WC
Lab ID:	104336-01
Date Received:	3/2/02
Date Prepared:	3/13/02
Date Analyzed:	3/13/02
% Solids	-
Dilution Factor	1

## Dissolved Organic Carbon by USEPA Method 9060

Analyte	Result (mg/L)	PQL	MDL	Flags
DOC	1.89 J	0.5	0.35	

MN 3/26/02

# STL Seattle

Client Name	URS Corporation
Client ID:	020228IW06WC
Lab ID:	104336-02
Date Received:	3/2/02
Date Prepared:	3/13/02
Date Analyzed:	3/13/02
% Solids	-
Dilution Factor	1

## Dissolved Organic Carbon by USEPA Method 9060

Analyte	Result (mg/L)	PQL	MDL	Flags
DOC	1.83 J	0.5	0.35	

MW 3/26/02



# STL Seattle

Client Name	URS Corporation
Client ID:	020228IW05WC
Lab ID:	104336-01
Date Received:	3/2/02
Date Prepared:	3/8/02
Date Analyzed:	3/8/02
% Solids	-
Dilution Factor	1

## Total Organic Carbon by USEPA Method 9060

Analyte	Result (mg/L)	PQL	MDL	Flags
TOC	1.7 J	0.5	0.35	

MN 3/26/02



# STL Seattle

Client Name	URS Corporation
Client ID:	020228IW06WC
Lab ID:	104336-02
Date Received:	3/2/02
Date Prepared:	3/8/02
Date Analyzed:	3/8/02
% Solids	-
Dilution Factor	1

## Total Organic Carbon by USEPA Method 9060

Analyte	Result (mg/L)	PQL	MDL	Flags
TOC	2.4 J	0.5	0.35	

MN 3/26/02

# STL Seattle

Client Name	URS Corporation
Client ID:	020304IW07WC
Lab ID:	104395-01
Date Received:	3/6/02
Date Prepared:	3/8/02
Date Analyzed:	3/15/02
% Solids	-
Dilution Factor	1

## PCBs by USEPA Method 8082

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tetrachloro-m-xylene	53.8		40	99
Decachlorobiphenyl	58		44	123

Analyte	Result (ug/L)	PQL	MDL	Flags
Aroclor 1016	ND	0.00513	0.00103	
Aroclor 1221	ND	0.0103	0.00256	
Aroclor 1232	ND	0.00513	0.00122	
Aroclor 1242	ND	0.00513	0.00169	
Aroclor 1248	ND	0.00513	0.0008	
Aroclor 1254	0.0308	0.00513	0.00103	C1
Aroclor 1260	ND	0.00513	0.000564	

# STL Seattle

Client Name	URS Corporation
Client ID:	020304IW07WC
Lab ID:	104395-02
Date Received:	3/6/02
Date Prepared:	3/15/02
Date Analyzed:	3/19/02
% Solids	-
Dilution Factor	1

## PCBs by USEPA Method 8082 - from Particulate Captured on Filter

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tetrachloro-m-xylene	87.8		50	130
Decachlorobiphenyl	91.9		50	130

Analyte	Result (ug/L)	PQL	MDL	Flags
Aroclor 1016	ND	0.00513	0.00103	
Aroclor 1221	ND	0.0103	0.00256	
Aroclor 1232	ND	0.00513	0.00122	
Aroclor 1242	ND	0.00513	0.00169	
Aroclor 1248	ND	0.00513	0.0008	
Aroclor 1254	0.0218	0.00513	0.00103	C1
Aroclor 1260	ND	0.00513	0.000564	



# STL Seattle

Client Name	URS Corporation
Client ID:	020304IW07WC
Lab ID:	104395-01
Date Received:	3/6/02
Date Prepared:	3/13/02
Date Analyzed:	3/13/02
% Solids	-
Dilution Factor	1

## Dissolved Organic Carbon by USEPA Method 9060

Analyte	Result (mg/L)	PQL	MDL	Flags
DOC	2.84	0.5	0.35	

# STL Seattle

Client Name	URS Corporation
Client ID:	020304IW07WC
Lab ID:	104395-01
Date Received:	3/6/02
Date Prepared:	3/12/02
Date Analyzed:	3/12/02
% Solids	-
Dilution Factor	1

## Total Organic Carbon by USEPA Method 9060

Analyte	Result (mg/L)	PQL	MDL	Flags
TOC	1.9	0.5	0.35	





## Field Turbidity Data Sheet

Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 1

**Monitoring Dates:** 2/27, 2/28, 3/1, 3/2, 3/4/2002

**Weather:** 2/27: Sunny, 60 F, calm

2/28: Partly sunny, 40-45 F, calm

3/1: Partly sunny, 35 F, calm

3/2: Sunny, 35 F, slight easterly wind, calm

3/4: Sunny, 35 F, slight westerly wind

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
2/27/02	Sample Location # 020227IW04WC	30	1300		3.55	Background sample location at Pile 1
			1330			
2/27/02	Down current (upriver)	30	1410	24	6.78	Diver in water at 1410 Current real low
				18	7.83	
			1425	6	8.92	
2/27/02	Up current (downriver)	35	1430	28	7.29	Current real low Next reading: 1640
				21	7.5	
			1440	7	9.18	
2/27/02	Down current	50+		40	5.43	Current is very strong (strongest yet-generating power?)
				30	5.96	
				10	2.5	
2/27/02	Down current	50+	1500	40	4.17	Strong current Next reading: 1515
				30	5.43	
			1505	10	6.87	
2/27/02	Down current	50+	1515	40	8.63	Strong current
				30	9.18	
				10	10.02	
2/27/02	Down current	50+	1535	40	7.5	Strong current
				30	7.5	
				10	9.18	
2/27/02	Down current	50+	1555	40	5.45	Strong current
				30	6.06	
			1605	10	7.97	
2/27/02	Down current	50+	1620	40	4.56	Divers out of water at 1630
				30	6.29	
			1625	10	7.45	
2/28/02	Up current (west of work area)	35	0755	28	3.77	Checked meter with 1000 NTU (912 NTU) and 20 NTU (20) solutions One diver in water at 0845
				21	4.17	

## Field Turbidity Data Sheet

Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 1

**Monitoring Dates:** 2/27, 2/28, 3/1, 3/2, 3/4/2002

**Weather:** 2/27: Sunny, 60 F, calm

2/28: Partly sunny, 40-45 F, calm

3/1: Partly sunny, 35 F, calm

3/2: Sunny, 35 F, slight easterly wind, calm

3/4: Sunny, 35 F, slight westerly wind

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
			0800	7	5.43	Second diver in water at 0905
2/28/02	Down current (east of work area)	28	0910	22.5	4.17	
				17	4.77	
			0915	5.5	6.06	
2/28/02	Down current (east of work area)	28	0925	22.5	5.64	Visibility 5 feet
				17	6.06	
			0930	5.5	6.06	
2/28/02	Down current (east of work area)	28	0940	22.5	4.17	Visibility 5 feet
				17	4.17	
			0945	5.5	4.75	
2/28/02	Down current (east of work area)	28	0950	22.5	6.06	Visibility 5 feet
				17	7.08	
			0955	5.5	4.98	
2/28/02	Down current (east of work area)	28	1005	22.5	4.35	
			1015	17	4.98	
				5.5	6.66	
2/28/02	Down current (east of work area)	28	1025	22.5	5.64	
			1030	17	4.77	
				5.5	6.06	
2/28/02	Down current (east of work area)	28	1040	22.5	3.96	One diver out of water at 1040 Current picked up (very strong now)
				17	3.96	
			1045	5.5	6.87	
2/28/02	Up current	35	1105	28	7.08	Very strong easterly current Next reading: 1310
				21	6.55	
			1110	7	6.98	
2/28/02	Down current	28	1140	22.5	7.94	Next reading: 1155
			1145	17	8.27	
				5.5	7.5	
			1155	22.5	6.66	Next reading: 1210

## Field Turbidity Data Sheet

Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 1

**Monitoring Dates:** 2/27, 2/28, 3/1, 3/2, 3/4/2002

**Weather:** 2/27: Sunny, 60 F, calm

2/28: Partly sunny, 40-45 F, calm

3/1: Partly sunny, 35 F, calm

3/2: Sunny, 35 F, slight easterly wind, calm

3/4: Sunny, 35 F, slight westerly wind

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
2/28/02	Down current	28		17	6.27	
			1200	5.5	7.29	
2/28/02	Down current	28	1210	22.5	7.08	
				17	7.5	
			1215	5.5	9.55	
2/28/02	Sample Location # 020228IW05WC		1300		3-8	Spiked at 10-14 for ~10 seconds Monitored from man basket hung by crane
			1400			
2/28/02	Up current	35	1445	28	8.16	1400-1500: Used suction hose under electrical debris (Foss in motor boat)
				21	8.55	
			1450	7	6.66	
2/28/02	Down current (off barge as Foss is using the boat)	50+	1500	40	6.06	Strong current
				30	5.64	
			1505	10	7.59	
2/28/02	Down current	50+	1515	40	8.16	Strong current One diver out of water
				30	8.55	
			1520	10	7.08	
2/28/02	Down current	50+	1530	40	6.66	
				30	8.33	
			1535	10	6.45	
2/28/02	Down current	50+	1550	40	3.98	Current picked up Diver and basket out of water at 1600
				30	6.06	
			1555	10	4.77	
3/1/02	Up current	35	0745	28	8.16	Pool elevation dropped ~1 foot (74 feet MSL approx)
				21	8.37	
			0750	7	7.95	
3/1/02	Down current (in boat)	40	0850	32	1.86	Diver in water at 0840 Strong current Visibility 5 feet
				24	2.07	
			0855	8	5.64	



## Field Turbidity Data Sheet

Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 1

**Monitoring Dates:** 2/27, 2/28, 3/1, 3/2, 3/4/2002

**Weather:** 2/27: Sunny, 60 F, calm

2/28: Partly sunny, 40-45 F, calm

3/1: Partly sunny, 35 F, calm

3/2: Sunny, 35 F, slight easterly wind, calm

3/4: Sunny, 35 F, slight westerly wind

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
3/1/02	Down current (in boat)	40	0905	32	2.07	Current is stronger here (eastern tip of island) than at background location
				24	3.86	
			0910	8	10.86	
3/1/02	Down current (in boat)	40	0920	32	2.07	Visibility 5 feet
				24	3.54	
			0925	8	5.43	
3/1/02	Down current (in boat)	40	0935	32	2.54	
				24	3.33	
			0940	8	2.91	
3/1/02	Down current (in boat)	40	1025	32	5.64	Changed batteries
				24	6.66	Visibility 5 feet
			1035	8	7.08	Current dropped
3/1/02	Down current (in boat)	40	1045	32	3.96	Visibility 5 feet
				24	5.64	
			1050	8	6.27	
3/1/02	Down current (in boat)	40	1100	32	3.13	Current picked up
				24	2.91	
			1105	8	5.64	
3/1/02	Down current (in boat)	40	1115	32	5.64	
				24	6.06	
			1120	8	4.56	
3/1/02	Up current	35	1130	28	5.43	One diver out of water at 1145
				21	6.06	
			1135	7	6.27	
3/1/02	Down current	40	1200	32	3.54	Current is stronger downstream location than at the upstream location
				24	3.75	
			1210	8	6.06	
3/1/02	Down current	40	1220	32	4.77	Second diver and basket out of the water at 1235
				24	5.64	

## Field Turbidity Data Sheet

Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 1

**Monitoring Dates:** 2/27, 2/28, 3/1, 3/2, 3/4/2002

**Weather:** 2/27: Sunny, 60 F, calm

2/28: Partly sunny, 40-45 F, calm

3/1: Partly sunny, 35 F, calm

3/2: Sunny, 35 F, slight easterly wind, calm

3/4: Sunny, 35 F, slight westerly wind

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
			1225	8	5.43	
3/1/02	Down current	40	1235	32	4.56	Both divers and basket out of the water 1240-1430: Remove debris from beach (on shore)
				24	6.66	
			1240	8	5.64	
3/1/02	Down current	50+	1440	40	6.87	From barge (Foss using the boat to pump) Very strong current
				30	7.5	
			1445	10	4.77	
3/1/02	Down current	50+	1455	40	3.17	From barge (Foss using the boat to pump) Very strong current
				30	5.64	
			1500	10	5.85	
3/1/02	Down current	50+	1520	40	5.22	From barge (Foss using the boat to pump) Very strong current
				30	5.64	
			1525	10	7.5	
3/1/02	Down current	50+	1535	40	6.06	From barge (Foss using the boat to pump) Very strong current Readings fluctuating
				30	6.06	
			1540	10	7.08	
3/1/02	Down current	40	1615	32	6.06	Foss finished with boat
				24	4.77	
			1620	8	5.23	
3/1/02	Down current	40	1630	32	5.64	First diver out of water at 1628 Second diver out of water at 1633 Basket out at 1633
				24	4.77	
			1635	8	5.85	
3/2/02	Up current (west of work area)	30	0825	24	3.75	
				18	5.43	
			0830	6	4.98	
3/2/02	Down current (in boat)	40	0900	32	4.77	Diver in water at 0850
				24	6.66	
			0905	8	4.98	
			0915	32	3.75	Visibility 5 feet

## Field Turbidity Data Sheet

Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 1

**Monitoring Dates:** 2/27, 2/28, 3/1, 3/2, 3/4/2002

**Weather:** 2/27: Sunny, 60 F, calm

2/28: Partly sunny, 40-45 F, calm

3/1: Partly sunny, 35 F, calm

3/2: Sunny, 35 F, slight easterly wind, calm

3/4: Sunny, 35 F, slight westerly wind

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
3/2/02	Down current (in boat)	40		24	2.91	Stronger current at down current location
			0920	8	6.27	
3/2/02	Down current (in boat)	40	0930	32	5.46	Next reading: 0945
				24	7.29	
			0935	8	7.71	
3/2/02	Down current (in boat)	40	0945	32	4.77	Next reading: 1000
				24	4.35	
			0950	8	5.43	
3/2/02	Down current (in boat)	40	1000	32	6.87	Visibility 5 feet Next reading: 1015
				24	9.18	
			1005	8	7.08	
3/2/02	Down current (in boat)	40	1015	32	4.77	Next reading: 1030
				24	4.35	
			1020	8	6.06	
3/2/02	Down current (in boat)	40	1030	32	6.87	First diver out at 1030 Next reading: 1045
				24	8.76	
			1035	8	5.64	
3/2/02	Down current (in boat)	40	1045	32	4.17	
				24	4.35	
			1050	8	6.45	
3/2/02	Up current	30	1115	24	9.18	Wind picked up (5-10 mph)
				18	8.37	
			1120	6	5.43	
3/2/02	Down current	40	1130	32	3.12	Current stronger at down current location compared with up current
				24	4.77	
			1135	8	6.45	
3/2/02	Down current (in boat)	40	1145	32	3.12	Current picked up (very strong)
				24	4.17	
			1150	8	5.43	

## Field Turbidity Data Sheet

Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 1

**Monitoring Dates:** 2/27, 2/28, 3/1, 3/2, 3/4/2002

**Weather:** 2/27: Sunny, 60 F, calm

2/28: Partly sunny, 40-45 F, calm

3/1: Partly sunny, 35 F, calm

3/2: Sunny, 35 F, slight easterly wind, calm

3/4: Sunny, 35 F, slight westerly wind

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
3/2/02	Down current (in boat)	40	1205	32	4.56	Next reading: 1220
				24	6.06	
			1210	8	4.17	
3/2/02	Down current (in boat)	40	1220	32	4.98	
				24	5.64	
			1225	8	4.77	
3/2/02	Down current (in boat)	40	1235	32		Divers out of the water at 1230
				24		
				8		
3/2/02	Down current (in boat)	40	1325	32	5.43	Diver in water at 1320 Wind 15-20 mph
				24	4.56	
			1330	8	4.56	
3/2/02	Down current (in boat)	40	1340	32	4.98	Visibility 5 feet Next reading: 1355
				24	5.85	
			1345	8	5.22	
3/2/02	Down current (in boat)	40	1355	32	5.64	
				24	6.06	
				8	4.98	
3/2/02	Down current (in boat)	40	1415	32	3.07	Could not take readings as other motor boat in area
				24	3.13	
			1420	8	4.98	
3/2/02	Down current (in boat)	40	1430	32	4.77	Wind picked up Rough current
				24	5.75	
				8	4.17	
3/2/02	Up current	30	1445	24	3.75	Windy (10 mph)
			1450	18	3.54	
				6	2.91	
3/2/02	Down current (in boat)	40	1505	32	4.98	Current picked up
				24	4.77	



## Field Turbidity Data Sheet

Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 1

**Monitoring Dates:** 2/27, 2/28, 3/1, 3/2, 3/4/2002

**Weather:** 2/27: Sunny, 60 F, calm

2/28: Partly sunny, 40-45 F, calm

3/1: Partly sunny, 35 F, calm

3/2: Sunny, 35 F, slight easterly wind, calm

3/4: Sunny, 35 F, slight westerly wind

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
			1510	8	6.66	
3/2/02	Down current (in boat)	40	1520	32	4.17	
				24	4.17	
			1525	8	6.27	
3/2/02	Down current	40	1535	32	4.35	
				24	4.35	
			1540	8	6.27	
3/2/02	Down current	40	1550	32	3.96	
				24	4.17	
			1555	8	5.43	
3/2/02	Down current	40	1605	32	3.96	
				24	4.17	
			1610	8	5.22	
3/2/02	Down current	40	1620	32	2.86	One diver and basket out of water Second diver out of water at 1630
				24	2.91	
			1625	8	4.17	
3/4/02	Up current		0745	36	6.06	Low pool (down ~2.5 feet)
			0746	25	5.85	
			0747	8.5	5.43	
3/4/02	Down current (in boat)	50+	0835	40		Low pool, but strong current Diver in water at 0825
			0840	30		
				10		
3/4/02	Down current (in boat)	50+	0900	40	2.07	Changed batteries Strong current
				30	1.86	
			0905	10	4.56	
3/4/02	Down current (in boat)	50+	0915	40	0.86	
				30	1.86	
			0925	10	7.5	
			0935	40	1.22	

## Field Turbidity Data Sheet

Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 1

**Monitoring Dates:** 2/27, 2/28, 3/1, 3/2, 3/4/2002

**Weather:** 2/27: Sunny, 60 F, calm

2/28: Partly sunny, 40-45 F, calm

3/1: Partly sunny, 35 F, calm

3/2: Sunny, 35 F, slight easterly wind, calm

3/4: Sunny, 35 F, slight westerly wind

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
3/4/02	Down current (in boat)	50+		30	1.86	
			0940	10	5.43	
3/4/02	Down current (in boat)	50+	1025	40	4.17	Next reading: 1040
				30	5.43	
			1030	10	5.22	
3/4/02	Down current (in boat)	50+	1040	40	4.98	Second diver out of the water at 1045 Next reading: 1055
				30	3.75	
			1045	10	4.75	
3/4/02	Down current (in boat)	50+	1100	40	3.75	First diver in water at 1100
				30	4.96	
			1105	10	5.64	
3/4/02	Down current (in boat)	50+	1115	40	2.07	Second diver in water at 1110 Next reading: 1130
				30	3.54	
			1120	10	6.87	
3/4/02	Down current (in boat)	50+	1130	40	5.43	
				30	6.87	
				10	5.22	
3/4/02	Down current (in boat)	50+	1140	40	2.07	Visibility 5 feet
				30	6.06	
			1145	10	5.46	
3/4/02	Down current (in boat)	50+	1155	40	6.66	Diver out of the water at 1200
				30	5.43	
			1200	10	6.27	
3/4/02	Sample Location # 020304IW07WC (+ USACE Duplicate)	~20	1330		High of 17	Sampling/removal work complete
					Avg 7-10	
			1355			

Notes:

<sup>1</sup>River depth measured from average pool elevation to river bottom at the location of the turbidity monitoring station.

## Field Turbidity Data Sheet

Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 1

**Monitoring Dates:** 2/27, 2/28, 3/1, 3/2, 3/4/2002

**Weather:** 2/27: Sunny, 60 F, calm

2/28: Partly sunny, 40-45 F, calm

3/1: Partly sunny, 35 F, calm

3/2: Sunny, 35 F, slight easterly wind, calm

3/4: Sunny, 35 F, slight westerly wind

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
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<sup>2</sup>Turbidity meter readings will be collected at 20%, 60%, and 80% of the river depth.

<sup>3</sup>Note any visual observations of turbidity.

<sup>4</sup>Enter in the estimated time that the next turbidity readings will be recorded.

# Field Turbidity Data Sheet

Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 2

**Monitoring Dates:** 2/22, 2/23, 2/25, 2/26, 2/27/2002

**Weather:** 2/22: Cloudy, 50-55 F, wind ~10-15 mph

2/23: Rain, 45 F, wind 5-10 mph

2/25: Sunny, clear, very windy

2/26: Sunny, 60 F, very calm, slight breeze

2/27: Sunny, 35 F, calm, slight easterly wind

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
2/22/02	Up current (materials barge)	28	0910	23	3.75	1110: Diver in water
				13	3.96	
				5-6	5.64	
2/22/02	Down current	42.5	0950	34	6.66	Strong easterly current Next reading: 1000
				25.5	6.87	
				8.5	8.16	
2/22/02	Down current	42.5	1000	34	7.09	1006: Diver out of water Next reading: 1015
				25.5	6.45	
			1005	8.5	8.76	
2/22/02	Down current	42.5	1010	34	7.08	1016: Diver in water Next reading: 1025
				25.5	7.94	
			1015	8.5	10.56	
2/22/02	Down current	42.5	1025	34	6.93	Next reading: 1040
				25.5	7.5	
			1030	8.5	7.55	
2/22/02	Down current	42.5	1040	34	5.22	Hauled out full work bin Next reading: 1055
				25.5	5.43	
			1045	8.5	7.5	
2/22/02	Down current	42.5	1055	34	5.22	Next reading: 1110
				25.5	5.11	
			1100	8.5	6.26	
2/22/02	Down current	42.5	1110	34	4.77	Next reading: 1125
				25.5	5.95	
			1115	8.5	5.8	
2/22/02	Down current	42.5	1125	34	2.69	Inform Chris of need for background divers removing debris Next reading: 1140
				25.5	3.12	
			1130	8.5	6.26	
2/22/02	Down current	42.5	1140	34	2.68	Next reading: 1155
				25.5	3.23	
			1145	8.5	6.27	



# Field Turbidity Data Sheet

## Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 2

**Monitoring Dates:** 2/22, 2/23, 2/25, 2/26, 2/27/2002

**Weather:** 2/22: Cloudy, 50-55 F, wind ~10-15 mph

2/23: Rain, 45 F, wind 5-10 mph

2/25: Sunny, clear, very windy

2/26: Sunny, 60 F, very calm, slight breeze

2/27: Sunny, 35 F, calm, slight easterly wind

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
2/22/02	Down current	42.5	1150	34	3	
				25.5	3.58	
			1155	8.5	8.06	
2/22/02	Up current	28	1220	23	3.96	Clear, visibility 7 feet Stong current
				14	5.31	
				5.5	4.36	
2/22/02	Down current	50	1300	40	6.26	Clear, visibility 7 feet Stong current Next reading: 1315
				30	7.58	
			1305	10	8.57	
2/22/02	Down current	50	1315	40	4.2	Next reading: 1330
				30	5.21	
			1320	10	9.21	
2/22/02	Down current	50	1330	40	5	Diver below boat
				30	6.35	
			1335	10	7.41	
2/22/02	Down current	50	1345	40	5.85	One diver in river Next reading: 1400
				30	6.06	
			1350	10	7.06	
2/22/02	Down current	50	1400	40	4.86	Visibility 7.5 feet
				30	5.1	
			1405	10	7.78	
2/22/02	Down current	50	1415	40	5.5	1415: Second diver in water Next reading: 1430
				30	5.64	
			1420	10	6.87	
2/22/02	Down current	50	1430	40	4.95	
				30	5.64	
			1435	10	8.16	
2/22/02	Up current (west of down current location)	28	1445	23	6.66	Visibility 7.5 feet Next reading: 1655
				14	6.77	
			1455	5.5	8.35	

# Field Turbidity Data Sheet

## Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 2

**Monitoring Dates:** 2/22, 2/23, 2/25, 2/26, 2/27/2002

**Weather:** 2/22: Cloudy, 50-55 F, wind ~10-15 mph

2/23: Rain, 45 F, wind 5-10 mph

2/25: Sunny, clear, very windy

2/26: Sunny, 60 F, very calm, slight breeze

2/27: Sunny, 35 F, calm, slight easterly wind

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
2/22/02	Down current	50	1510	40	7.29	Visibility 7 feet
				30	7.08	Strong current
			1515	10	8.05	Next reading: 1525
2/22/02	Down current	50	1525	40	7.29	Clear, visibility 7 feet
				30	8.65	Next reading: 1540
			1530	10	10.02	
2/22/02	Down current	50	1540	40	6.66	1545: One diver out
				30	7.29	Next reading: 1555
			1545	10	8.16	
2/22/02	Down current	50	1555	40	6.87	Work bin and diver (last one) out of water
				30	7.29	
			1600	10	8.16	
2/22/02	Down current	50	1610	40	6.66	1407: Diver back in water
				30	6.87	Diver below boat
			1615	10	7.71	
2/22/02	Down current	50	1620	40	4.56	Diver and work basket within 20 feet of monitoring location
				30	4.77	1625: Diver and work basket out of water
			1625	10	5.43	
2/23/02	Up current	28	0730	24	2.07	No divers in water
				16	3.54	Next reading: 0930
				5.5	3.54	
2/23/02	Down current	50	0930	40	2.95	Diver in water at 0840
				30	3.17	Sample preparation 0840-0930
			0935	10	4.17	Next reading: 0945
2/23/02	Down current	50	0945	40	4.9	Second diver in water at 0935
				30	5.22	Strong current
			0950	10	6.49	Next reading: 1000
2/23/02	Down current	50	1000	40	4.17	Visibility 7 feet
				30	4.35	Next reading: 1015
			1005	10	6.45	

# Field Turbidity Data Sheet

## Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 2

**Monitoring Dates:** 2/22, 2/23, 2/25, 2/26, 2/27/2002

**Weather:** 2/22: Cloudy, 50-55 F, wind ~10-15 mph

2/23: Rain, 45 F, wind 5-10 mph

2/25: Sunny, clear, very windy

2/26: Sunny, 60 F, very calm, slight breeze

2/27: Sunny, 35 F, calm, slight easterly wind

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
2/23/02	Down current	50	1010	40	4.36	Foss pumping water/sediment from around electrical debris
				30	4.77	
			1015	10	6.45	
2/23/02	Up current (west of Pile 2)	28	1030	24	5.64	Next reading: 1235
				15.5	6.06	
			1035	5.5	4.17	
2/23/02	Down current	50	1040	40	6.06	Foss finish pumping at 1045
				30	6.27	
			1045	10	7.29	
2/23/02	Sample Location # 020223IW02WC	10	1050		26-3.33	Monitored during sample collection
					AVG: 9-10	
			1140			
2/23/02	Up current	28	1220	24	5.77	Strong current Next reading: 1425
				16	5.22	
			1225	5.5	6.66	
2/23/02	Down current	50	1235	40	4.35	Basket out of water
				30	4.77	
			1240	10	6.27	
2/23/02	Down current	50	1255	40	6.27	One diver still in water Next reading: 1310
				30	6.55	
			1300	10	8.50	
2/23/02	Down current	50	1310	40	5.85	1315: Remove iron rope
				30	6.06	
			1315	10	8.16	
2/23/02	Down current	50	1325	40	6.06	Second diver in water at 1322 1324: Basket out of water
				30	5.85	
			1330	10	7.71	
2/23/02	Down current	50	1340	40	5.85	One diver out of water at 1325 1355: Remove iron rope
				30	6.06	
			1345	10	9.18	

# Field Turbidity Data Sheet

## Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 2

**Monitoring Dates:** 2/22, 2/23, 2/25, 2/26, 2/27/2002

**Weather:** 2/22: Cloudy, 50-55 F, wind ~10-15 mph

2/23: Rain, 45 F, wind 5-10 mph

2/25: Sunny, clear, very windy

2/26: Sunny, 60 F, very calm, slight breeze

2/27: Sunny, 35 F, calm, slight easterly wind

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
2/23/02	Down current	50	1400	40	3.75	Basket in water
				30	3.33	Stronger current closer to island
			1405	10	3.33	Moved further downstream in boat
2/23/02	Down current	50	1415	40	3.75	Hit 22 NTU for ~3 seconds
				30	4.77	Hovered at 10 NTU for about 10-15 seconds at depth of 40 ft
				10	5.96	
2/23/02	Down current	50		40	1-3	Dropped back down to 3.75 for 5 minutes Monitored continuously for 20 minutes (between 1415 and 1435)
				30	1-3	
			1435	10	1-3	
2/23/02	Down current	50	1435	40	1-3	Unit was dragging on the river bottom, which is due to drop in current and resulted in high reading Next reading: 1450
				30	1-3	
			1440	10	1-3	
2/23/02	Down current	50	1445	40	1-3	
				30	1-3	
			1450	10	3.78	
2/23/02	Up current	28	1505	23	3.96	
				16	4.17	
			1510	5.5	5.86	
2/23/02	Down current	50	1520	40	3.77	Clear, visibility 7 feet
				30	4.96	
			1525	10	5.64	
2/23/02	Down current	50	1550	40	5.22	Chris departs site at 1530 Basket out of water at 1640
				30	5.86	
			1555	10	6.26	
2/23/02	Down current	50	1605	40	4.96	Basket in water at 1605 Basket out of water at 1608 Divers out of water at 1615
				30	4.55	
			1610	10	5.64	
2/25/02	Up current (west of Pile 2)	28		24	3.33	Next reading: 1000 Very choppy
				16	3.75	
			0800	5.5	6.87	



# Field Turbidity Data Sheet

## Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 2

**Monitoring Dates:** 2/22, 2/23, 2/25, 2/26, 2/27/2002

**Weather:** 2/22: Cloudy, 50-55 F, wind ~10-15 mph

2/23: Rain, 45 F, wind 5-10 mph

2/25: Sunny, clear, very windy

2/26: Sunny, 60 F, very calm, slight breeze

2/27: Sunny, 35 F, calm, slight easterly wind

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
2/25/02	Down current	50	0845	40	3.33	Diver in water at 0830 Next reading: 0900
				30	1.86	
			0850	10	3.21	
2/25/02	Down current	50	0900	40	2.7	Second diver in water at 0905
				30	3.21	
			0905	10	3.33	
2/25/02	Down current	50	0915	40	2.7	Visibility 7 feet Next reading: 0930
				30	3.21	
			0920	10	3.33	
2/25/02	Down current	50	0930	40	2.91	Very strong current Next reading: 0945
				30	2.7	
			0935	10	6.06	
2/25/02	Down current	50	0945	40	2.7	Next reading: 1000
				30	2.91	
			0950	10	7.95	
2/25/02	Down current	50	1000	40	1.86	Next reading: 1015
				30	2.7	
			1005	10	8.37	
2/25/02	Up current	28	1020	24	3.96	Next reading: 1225
				15.5	4.17	
			1025	5.5	7.5	
2/25/02	Down current	50	1035	40	5.22	Next reading: 1050
				30	4.98	
			1040	10	6.06	
2/25/02	Down current	50	1100	40	3.77	Diver out of water at 1055 Next reading: 1115
				30	4.13	
			1105	10	7.71	
2/25/02	Down current	50	1115	40	4.13	Diver back in water at 1115
				30	4.13	
				10	6.06	

# Field Turbidity Data Sheet

## Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 2

**Monitoring Dates:** 2/22, 2/23, 2/25, 2/26, 2/27/2002

**Weather:** 2/22: Cloudy, 50-55 F, wind ~10-15 mph

2/23: Rain, 45 F, wind 5-10 mph

2/25: Sunny, clear, very windy

2/26: Sunny, 60 F, very calm, slight breeze

2/27: Sunny, 35 F, calm, slight easterly wind

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
2/25/02	Down current	50	1140	40	2.95	Next reading: 1155
				30	2.7	
			1145	10	2.95	
2/25/02	Down current	50	1155	40	3.95	Winds picked up (25-30 mph)
				30	4.17	Next reading: 1210
			1200	10	10.02	
2/25/02	Down current	50	1210	40		Divers out of water at 1215
				30		Moved barges ~60 ft east (upstream) to central third of Pile 2
				10		
Moved barges ~60 feet east (upstream) to central third of Pile 2.						
2/25/02	Up current	33	1340	26.5	3.96	Diver in water at 1350
				20	4.17	
			1345	6.5	3.96	
2/25/02	Down current	50	1355	40	3.97	Next reading: 1410
				30	4.17	
			1400	10	4.33	
2/25/02	Down current	50	1410	40	3.75	Second diver in water at 1405
				30	3.54	Deep conditions (divers at 46 feet)
			1420	10	7.71	Next reading: 1430
2/25/02	Down current	50	1430	40	3.96	
				30	4.54	
			1435	10	8.55	
2/25/02	Down current	50	1445	40	3.54	Visibility 5 feet
				30	3.75	
			1450	10	7.90	
2/25/02	Down current	50	1520	40	4.13	Changed battery
				30	4.57	
			1525	10	8.16	

# Field Turbidity Data Sheet

## Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 2

**Monitoring Dates:** 2/22, 2/23, 2/25, 2/26, 2/27/2002

**Weather:** 2/22: Cloudy, 50-55 F, wind ~10-15 mph

2/23: Rain, 45 F, wind 5-10 mph

2/25: Sunny, clear, very windy

2/26: Sunny, 60 F, very calm, slight breeze

2/27: Sunny, 35 F, calm, slight easterly wind

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
2/25/02	Up current	23	1530	26.5	5.85	
				20	5.64	
			1535	6.5	6.27	
2/25/02	Down current	50	1535	40	7.75	Next reading: 1550
				30	8.06	
			1540	10	10.02	
2/25/02	Down current	50	1550	40	6.77	Diver out of water at 1550
				30	6.86	
			1555	10	7.97	
2/26/02	Up current (west of work area on materials barge)	33	0730	26	5.85	Pool is up a few feet Visibility 5 feet
				20	6.06	
			0735	6.5	7.95	
Checked turbidity meter vs. calibration fluids: 925 NTU at 1000, 27 NTU at 20.						Water is calm Current still strong Visibility 5 feet
2/26/02	Down current	50	0820	40	3.33	Diver in water at 0820 (off barge) Next reading: 0835
				30	4.75	
			0825	10	4.96	
2/26/02	Down current	28	0840	23.5	5.75	Moved locations (in boat) Next reading: 0855
				17	5.22	
			0845	5.5	7.95	
2/26/02	Down current	28	0855	22.5	6.66	Next reading: 0910
				17	7.08	
			0900	5.5	9.81	
2/26/02	Down current	28	0910	22.5	6.85	Basket out of water at 0930 Next reading: 0925
				17	7.08	
			0915	5.5	8.06	
2/26/02	Down current	28	0925	22.5	6.87	Basket in water at 0920 Next reading: 0940
				17	7.08	
			0930	5.5	7.29	

# Field Turbidity Data Sheet

## Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 2

**Monitoring Dates:** 2/22, 2/23, 2/25, 2/26, 2/27/2002

**Weather:** 2/22: Cloudy, 50-55 F, wind ~10-15 mph

2/23: Rain, 45 F, wind 5-10 mph

2/25: Sunny, clear, very windy

2/26: Sunny, 60 F, very calm, slight breeze

2/27: Sunny, 35 F, calm, slight easterly wind

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
2/26/02	Down current	28	0940	22.5	5.22	One diver out of water at 0945
				17	5.43	Next reading: 0955
			0945	5.5	6.87	
2/26/02	Down current	28	0955	22.5	5.10	Next reading: 1010
			1000	17	5.43	
				5.5	6.87	
2/26/02	Down current	28	1010	22.5	4.13	Next reading: 1025
				17	5.10	
			1015	5.5	5.98	
2/26/02	Down current	28	1025	22.5	4.35	Next reading: 1040
				17	4.35	
			1030	5.5	5.10	
2/26/02	Sample Location # 020226IW03WC	~45	1100		4-6.77	Short spike up to 25 for ~5 seconds.
						Chris Moody indicated divers camera in showed clear conditions
			1130			predominated during sampling
Diver out of water at ~1145. Move to final third portion (east side) of Pile 2.						
2/26/02	Up current (materials barge) at final third portion of Pile 2	31	1305	24	7.08	Diver in water at 1310
				18	7.54	Pool elevation has dropped ~1-2 feet, BPA is generating power
			1310	6	6.06	(started at 1200)
2/26/02	Down current	50	1315	40	6.45	Visibility 5 feet
			1320	30	7.08	Next reading: 1330
				10	8.16	
2/26/02	Down current	50	1330	40	6.45	Current dropped
				30	7.08	Next reading: 1345
			1335	10	10.46	
2/26/02	Down current	50	1345	40	8.06	Visibility 5 feet
				30	8.66	Current still low
			1355	10	10.02	



# Field Turbidity Data Sheet

## Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 2

**Monitoring Dates:** 2/22, 2/23, 2/25, 2/26, 2/27/2002

**Weather:** 2/22: Cloudy, 50-55 F, wind ~10-15 mph

2/23: Rain, 45 F, wind 5-10 mph

2/25: Sunny, clear, very windy

2/26: Sunny, 60 F, very calm, slight breeze

2/27: Sunny, 35 F, calm, slight easterly wind

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
2/26/02	Down current	50	1405	40	5.43	Next reading: 1425
				30	6.45	
			1415	10	7.5	
2/26/02	Down current	50	1425	40	8.06	Next reading: 1445
				30	8.66	
			1435	10	10.46	
2/26/02	Down current	50	1445	40	5.64	Switched divers at 1442
				30	6.06	
			1450	10	7.5	
2/26/02	Down current	50	1500	32	5.22	Very low current Next reading: 1515
				24	5.64	
			1505	8	6.66	
2/26/02	Down current	50	1515	32	4.17	Very slow current (to the east) Next reading: 1530
				24	4.75	
			1520	8	5.22	
2/26/02	Down current	50	1530	32	5.1	Next reading: 1545
				24	5.43	
			1535	8	6.06	
2/26/02	Down current	50	1545	32	4.77	Next reading: 1600
				24	5.44	
			1550	8	4.56	
2/26/02	Down current	50	1605	32	3.17	Current picked up slightly Diver out of water at 1415
				24	3.54	
			1610	8	3.98	
2/27/02	Up current (west of work area)	31	0740	24	3.33	Diver in water at 0825
				18	3.75	
				6	3.54	
2/27/02	Down current	38	0830	30.5	2.7	Strong east current Second diver in water at 0840 Next reading: 0845
				23	3.43	
			0835	7.5	3.96	

# Field Turbidity Data Sheet

Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 2

**Monitoring Dates:** 2/22, 2/23, 2/25, 2/26, 2/27/2002

**Weather:** 2/22: Cloudy, 50-55 F, wind ~10-15 mph

2/23: Rain, 45 F, wind 5-10 mph

2/25: Sunny, clear, very windy

2/26: Sunny, 60 F, very calm, slight breeze

2/27: Sunny, 35 F, calm, slight easterly wind

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
2/27/02	Down current	38	0845	30.5	5.43	Next reading: 0900
				23	5.64	
			0850	7.5	6.27	
2/27/02	Down current	38	0900	30.5	5.22	Visibility 5 feet
				23	5.64	Next reading: 0915
			0905	7.5	7.71	
2/27/02	Down current	38	0915	30.5	4.77	Next reading: 0935
				23	5.43	
			0925	7.5	6.86	
2/27/02	Down current	38	0935	30.5	5.43	Visibility 5 feet
				23	5.64	Next reading: 0950
			0940	7.5	7.98	
2/27/02	Down current	38	0950	30.5	4.5	Next reading: 1005
				23	5.22	
			0955	7.5	7.5	
2/27/02	Down current	38	1005	30.5	5.22	Next reading: 1020
				23	5.43	
			1010	7.5	8.16	
2/27/02	Down current	38	1020	30.5	4.77	Divers complete survey
				23	5.22	Began removing anchors
			1030	7.5	6.27	Divers out of water at 1035, mobilize to Pile 1 1045-1345

Notes:

<sup>1</sup>River depth measured from average pool elevation to river bottom at the location of the turbidity monitoring station.

<sup>2</sup>Turbidity meter readings will be collected at 20%, 60%, and 80% of the river depth.

<sup>3</sup>Note any visual observations of turbidity.

<sup>4</sup>Enter in the estimated time that the next turbidity readings will be recorded.

**Field Turbidity Data Sheet**  
Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 3

**Monitoring Date:** 2/21/02

**Weather:** Rain, 45-50 F

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
2/21/02	Up current (Materials barge)	50		15	3.48	Initial reading
			0745	30	4.26	No divers in water
				40	3.08	Next reading: ~0945
2/21/02	Down current	32		26	4.77	Initial reading
			0755	14.5	4.98	No divers in water
				6.5	5.22	
2/21/02	Down current	27.5	0825	22	4.67	Adjusted depths-current much slower than on 2/20
				16.5	4.88	Diver in water at 0810
			0830	5.5	5.33	Visibility 7 feet
2/21/02	Down current	32	0840	26	5.54	Current picked up
				19.5	5.43	Adjust depths
			0845	6.5	6.16	
2/21/02	Down current	32	0855	26	5.54	Next reading: 0910
				19.5	5.54	
			0900	6.5	5.75	
2/21/02	Down current	32	0910	26	5.54	Next reading: 0925
				19.5	5.56	
			0915	6.5	6.16	
2/21/02	Down current	32	0925	26	5.54	0920: Second diver in water
				19.5	5.33	Next reading: 0940
			0930	6.5	5.75	
2/21/02	Down current	32	0940	26	5.96	Visibility 7 feet
				19.5	5.43	
			0945	6.5	5.75	
2/21/02	Up current (Materials barge)	50	0955	40	4.26	Next reading: 1200
				30	4.26	
			1000	10	4.66	
2/21/02	Down current	32	1015	26	7.42	Visibility 7 feet
				19.5	7.63	Next reading: 1030
			1020	6.5	8.06	
2/21/02	Down current	32	1030	26	7.63	Next reading: 1045
				19.5	8.06	
			1035	6.5	8.06	

**Field Turbidity Data Sheet**  
Bradford Island In-Water Removal Work

**Monitoring Location:** Pile 3

**Monitoring Date:** 2/21/02

**Weather:** Rain, 45-50 F

Date	Station	Total River Depth (ft) <sup>1</sup>	Time	Depth of Reading (ft) <sup>2</sup>	Turbidity Reading (NTU)	Notes/Next Reading <sup>3,4</sup>
2/21/02	Down current	32	1045	26	7.4	Next reading: 1100
				19.5	7.55	
			1050	6.5	8.27	
2/21/02	Down current	32	1100	26	7.42	1100: One diver and work basket out of water Next reading: 1115
				19.5	7.63	
			1105	6.5	8.06	
2/21/02	Down current	32	1115	26	7.73	1100: Pull anchors out Removal at Pile #3 complete
				19.5	8.16	
			1120	6.5	8.36	
2/21/02	Down current	32	1130	26	7.64	Last diver out of water at 1125
				19.5	7.83	
				6.5	8.06	
2/21/02	Down current	32	1150	26	7.5	1151: Diver in water to remove last anchor
				19.5	8.06	
			1155	6.5	8.36	
2/21/02	Down current	32	1205	26	8.46	Next reading: 1220
				19.5	8.16	
			1210	6.5	7.73	
2/21/02	Down current	32	1220	26	8.06	Next reading: 1235
				19.5	8.36	
			1225	6.5	8.87	
2/21/02	Down current	32	1235	26	7.83	Still removing anchors Cannot get to BGD location due to crane activity
				19.5	8.98	
			1240	6.5	9.39	
2/21/02	Down current	32	1250	26	8.36	1230: Diver out of water Work at pile completed
				19.5	8.76	
			1255	6.5	9.28	
1250-1445: Mobilization from Pile 3 to Pile 2						
1445-1630: URS recons shoreline: found several seeps, found more concrete and metal (rope, cable, bolts) debris						

Notes:

<sup>1</sup>River depth measured from average pool elevation to river bottom at the location of the turbidity monitoring station.

<sup>2</sup>Turbidity meter readings will be collected at 20%, 60%, and 80% of the river depth.

<sup>3</sup>Note any visual observations of turbidity.

<sup>4</sup>Enter in the estimated time that the next turbidity readings will be recorded.